GAS JOURNAL

LIGHT ⸗ HEAT ⸗ POWER ⸗ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

Telephone: Central 6055. —— Telegrams: "GASKING, FLEET, LONDON."

VOL. CLXXX., No. 3368] WEDNESDAY, DECEMBER 7, 1927. [79TH YEAR.

Editorial Notes.

Consolidating Technical Ability in Our Organizations.

THESE are times of broad thinking and active development in all directions, which include the gas industry. A shaking-off of the shackles of certain old traditions which are useless in current circumstances, and are, in fact, an impediment, is proceeding. There is a greater feeling of freedom abroad to-day, and a desire to gain as much benefit from it as possible. Long ago we submitted, and many progressives in the gas profession urged, that the time had arrived when, in the interests of technical advancement, the engineering organizations of the industry should realize that engineering ability and qualification were not confined to those who are gas engineers and managers, but that the manufacturing firms from which gas plant and apparatus emanate are in possession of technical ability—inventive and constructional—of the very first order. That being so, the claim for providing for the admission of men possessing qualification and experience of value to the industry has often been presented and argued. Many engineers in the gas-supply industry have for years been favourable to this extension of the boundaries of membership; but ever and again there were those who were strong enough to put barriers between the old exclusiveness and the realization of a commonsense end.

Time, men, and conditions change. Those who have now the reins of office in hand have concluded that there must be an alteration—that full co-operation in technical discussion and action is highly desirable between gas-supply engineers and the technical men in the manufacturing and contracting firms in the industry. The developments outside the industry, and the cause of progress within the industry, urge this. It is necessary that we should bring to bear upon our interests the full extent of technical ability that is available for our varied and distinctive work. The changes that have taken place in organization have opened the way for this to be done. No longer, for instance, does the Institution of Gas Engineers have to deal with political and kindred matters affecting the gas-supply industry. That is the work of the National Gas Council, and the Gas Companies' Protection Association. Propaganda is dealt with by the "B.C.G.A.," and in our District Associations there are pendant Commercial Sections. Thus the Institution is now, fortunately and rightly, purely a technical body, and so are the District Associations. This fact clears away certain objections that were advanced some years ago that frequently the technical organizations had to deal with matters which it would be inconvenient to handle with representatives of the manufacturers in the membership. That reason—never a very robust one—for persisting in dissociation no longer exists. Development has supplied another argument; and it is that, apart from the engineering ability which has always obtained in the works of our manufacturers, all the principal ones have now scientific research staffs, who are constantly concentrating on matters appertaining to improvement in material, structure, and efficiency. They have varied and extensive opportunities which the gas-supply engineer does not and cannot possess; and it is to the mutual interest of all concerned that the work devoted to plant production and the daily experience of plant operation should be brought to bear the one upon the other.

In our issue for Nov. 23, there was reference to this question in relation to the amendment which has been made in the rules of the Southern Association, whereby, conditionally, technical men connected with the gas plant and apparatus manufacturing firms can be admitted to the organization as associates. It has also been known that the Council of the Institution of Gas Engineers have been considering the question of broadening its basis—this a result of long-time advocacy, and the coming of men with full appreciation of modern necessity, which declines to allow action to be moulded by tradition when it is plain that it is not in the best interests of the industry. The President of the Institution (Mr. H. D. Madden, M.Inst.C.E., of Cardiff) mentioned, at the meeting of the Southern Association, the matter of what the Council are doing in this direction; and allusion was also made to it in the Presidential Address of Mr. C. S. Shapley to the Manchester Institution (*ante* p. 607). A Special Committee have been framing rules and formulating safeguards; and their proposals have been unanimously adopted by the Council. Whatever the nature of the rules—whether open to complete acceptance or to criticism—the step itself is a wise one. It is right there should be safeguards; but there must be a care as to their character. All that is required is to ensure technical qualification. It is no use trying to get men of high engineering or chemical attainments into any technical gas organization if there is to be, for instance, classification which suggests inferior status. To our mind, that is not the correct way to go to work. Nor is it politic, at this stage, if there is any real wish to broaden the basis and intrinsic value of our technical organizations, to require the credentials of membership or associate membership of another body, or the possession of academical distinctions. Membership or associate membership of another professional body is secured on distinct conditions; and there should be no more difficulty (say) for the Council of the Institution of Gas Engineers to determine qualification for admission to their own body than it is, for instance, for the Council of the Institution of Civil Engineers to determine fitness for inclusion in their membership. The same applies to academical distinctions. We know of men who have qualifications and experience of a very high order in gas engineering,

who have engaged in designing and executing work which many gas-supply engineers would not think of undertaking unaided, but who are not members of the Civils, nor have they academical degrees. The work and reputations are sufficient credentials of professional worth. In broadening the basis of our technical organizations, there must be care that, in what is euphemistically termed "safeguarding," some of the cream of ability, qualification, and experience is not shut out. That would be a pity; and it cannot be beyond the power of the Council of the Institution or the Committee of any other technical gas organization to discriminate on their own account (without help from the Civils or a University) between those who are qualified and those who are not. Nothing should be allowed to defeat a good and essential purpose.

Should, however, there be a wish for imposing "safeguards," we would suggest for consideration the desirability of leaving them in abeyance for a limited initial period—say, two or three years—during which the Council of the Institution or the Committee of an Association could examine carefully the qualifications for admission, and accept applicants whose work alone gives them the title. After the initial period, the "safeguards" (such as the Southern ones) could become operative if thought desirable. This would ensure that existing suitable technical ability was not excluded from membership.

Developing Coal-Selling Organizations.

CONSIDERATION is spreading of the policy of creating coal-selling organizations in the coal areas, so as to cut-out the competition which leads to price-cutting. Following the establishment of the South Wales Coal-Marketing Association, there is now before the colliery owners of Yorkshire, Nottinghamshire, and Derbyshire, a scheme for the regulation of output, the improvement in the market for coal, and generally to place the industry on a paying basis. This has been prepared by a representative Committee of the coal owners of the three counties, who urge that the owners cannot indefinitely continue to bear losses on output. The regulation of output does not form part of the South Wales scheme; and it was on this point that, on a former occasion, proposals for improving the market conditions of the collieries in Yorkshire, Nottinghamshire, and Derbyshire came to grief. The South Yorkshire Coal Owners' Association have considered the scheme; with what result, is not yet known. The West Yorkshire Coal Owners' Association discussed the matter last Friday. No decision was arrived at; and the meeting was adjourned to a later date in order to enable the members individually to consider the details of the plan. However, the Committee who prepared the scheme are convinced that, without regulation or adjustment of output to market requirements, any scheme for price improvement will fail. It is also stated that the Committee have explored and rejected as unworkable the theory of a single national trust; and indeed, they are unfavourable to the creation of even a unified selling agency for the whole of Yorkshire, Nottinghamshire, and Derbyshire. In some quarters there is anxiety for the scheme to come into operation from Jan. 1; but at the moment there is no great hopefulness that the difficulties will be surmounted, and a unanimous view be created, in time for this to come to pass. One argument in favour of unified price control is that it will enable Continental agencies to be established for developing the export business. Regarding other coalfields, it is freely hinted that they will all, before many months expire, be exploring possibilities in the direction of price and output regulation. The gas industry, among other industrialists, will watch these schemes very narrowly. Gas undertakings, with their aggregate requirement of 17 million or so tons of coal a year, are deeply interested in the possible effects of these movements not only on the price of coal, but on that of coke-oven gas, and the competitive position of domestic coke from gas-works and coke ovens. One labour authority states that the Miners' Federation will oppose (so far as they have the power to do so) any scheme which will touch regulation of output. They foresee a further decline in employment for their constituents. From what we hear, it is pretty clear that, in these schemes, the coal owners have public utility concerns prominently in view. One Yorkshire paper reports that Captain P. Muschamp, Chief Agent for the New Hucknall Colliery Company, says he cannot see "why, under the proposed three counties scheme, householders should have to pay more for their coal; but railway companies, gas companies, and certain others who obtain the product at the owners' expense would have to pay more. At present they are getting coal at rates spelling a loss of from 1s. to 2s. 6d. per ton." Again, Mr. George Spencer, M.P., considers that the representatives of the miners should be consulted before the schemes reach a head. Like Captain Muschamp, he is of opinion that there are certain undertakings—utility concerns and other large enterprises—which are well able to pay higher prices for coal. There is matter here which invites criticism; but it is one of those questions which no doubt will be dealt with from headquarters.

Continuous Verticals and Intermittent Chambers.

A FINE discussion followed the excellent paper which Mr. T. Campbell Finlayson, M.Sc., read at the last meeting of the London and Southern Junior Association. It will be observed that the title of the contribution was "Carbonization in Vertical Retorts." The absence of "Continuous" is significant; and, as a matter of fact, the author dealt not only with the "W-D" system of continuous retorts, but with the "W-D" intermittent vertical chambers. We do not care to prophesy, but one cannot be oblivious of development brought about by research, experience, and requirement. It is computed that as much as 50 p.ct. of the coal carbonized in Great Britain to-day is dealt with in continuous vertical retorts; and there is good ground for saying that the continuous vertical system will continue to make rapid headway in our carbonizing operations. But our deliberate belief is that the system is not going to oust all other systems. Horizontal retorting has developed until, in several respects, but not in all, it is challenging both its continuous and intermittent competitors, in respect (for instance) of labour costs, though it does not claim such advantages as are realized by steaming vertical charges, and high output per unit of area. There are also the intermittent retort and chamber systems which come in for more prominent consideration, owing to developments in the carbonization process for the realization of improved results—partly due to the characteristics of the coal most available, partly to increased throughput in certain circumstances, and partly to the character of coke where coal that has the most economic availability is not of good coking quality. This all comes from the closer study that has been made of the part that the physical condition of the charge plays in carbonization.

The futility of judging a system by the thermal product per ton of coal is generally recognized to-day; the important factors are the net cost per therm produced, and coke quality for the local market. Various papers and reports have proved that the segregation of fines from certain classes of coal will improve throughput and results in continuous vertical retorts, with better quality of coke from the carbonization of the fines in intermittent retorts. In the combined continuous vertical and intermittent chamber plant that is going up at Glasgow, the separation of the small from the larger coal (low coking quality Scotch coal) will enhance not only the results in the continuous retorts, but will relieve them of the disadvantage of a large amount of breeze by utilizing the smalls in the intermittent chambers. Progress in results by adapting process to circumstance, and not blind adherence to one particular system, is the aim of gas engineers to-day, when "efficiency" is a term which is not limited by them to the thermal result per ton. It is acknowledged that, while the continuous system has marked advantages, intermittent vertical chambers have the ability to deal with any class of coal or slack; and, by steaming the charge the last few hours of the carbonizing period, they give a good account of themselves in respect of output per square foot of ground space and thermal yield per ton. The particular intermittent vertical cham-

bers with which Mr. Finlayson deals have already had adoption, for local reasons, at Ramsgate and Taunton, in addition to the large installation at Glasgow. It will, however, be noticed that in the paper the author treats of the intermittent chambers after continuous verticals; and it is as complementary to the continuous system, or for special conditions, that he regards as the proper sphere of the former. A description is given towards the end of the paper of the arrangements for dealing with the coal for the combined plant at Glasgow, which, it is claimed, will give the Gas Department flexibility in respect of output, selection of coal, and calorific value.

The paper contains many other points of interest—such as information regarding the large-size continuous vertical retorts which have been erected at Margate, and are under construction at Fulham. The author also illustrates (as has been done before) the mistake of thinking that continuous verticals are only for the larger works, by pointing to the Innerleithen installation of two retorts (with its 7-ton carbonizing capacity per day), and to the order for its increase by 50 p.ct.—one retort. There is the contrast of the largest installation of verticals ever erected at one time—the Provan plant of 192 retorts, with its carbonizing capacity of 1356 tons per day. Continuous working, it is proved, can go to the extremes of operation at either end of the scale of production.

The discussion on the paper was of a highly practical character, and is worth reading. It indicates, as several discussions on carbonization this year have done, that representations as to conduct and efficiency are not being taken for granted in these days—that experiences on questions of detail are receiving more individual attention and thought, and that there is a distinct trend to the acceptance of the fact that the physical conditions of retort charges constitute a very important factor in the results derived from even the best of plants.

Comparisons of Carbonizing Systems.

In the paper on "Vertical Intermittent Chamber Ovens for Gas Manufacture," by Mr. N. J. Bowater, O.B.E., B.Sc., Assoc.M.Inst.C.E., which was submitted at the first annual meeting of the Institute of Fuel," the point of view is expressed that intermittent chambers stand first as the last word in carbonization practice. He suggested that the war alone prevented a rapid extension in the use of this type of plant in this country. The attitude of the "JOURNAL" in respect of competing systems of coal carbonization and gasification is that of pure independence; but when advocates of one system utilize an opportunity for presenting matters derogatory of another, the statements require very careful examination. We ourselves are inclined to believe (as indicated in the comment on Mr. Finlayson's paper) that no one system can ever be of universal application for all the varying conditions.

Our first and main criticism of Mr. Bowater's paper is that he appears to be slightly out of touch with modern British gas-works practice and requirements. As Mr. John Roberts pointed out in his contribution to the discussion, the author is evidently inclined to think that in future it would be well for British gas engineers not to tie their hands in respect of the coal they use by adopting a carbonizing system which (in his imagination) is limited to a more or less fixed diet. It seems to us that Mr. Bowater is not very well informed, when he harbours the idea that with continuous vertical retorts, engineers are in the habit of having to get a particular coal. Large undertakings—Birmingham and Glasgow, for example—treat in their continuous verticals all kinds of coals from run-of-mine to slacks; and modern verticals have for many years been carbonizing Durham run-of-mine coals. There is no evidence that engineers by installing continuous verticals tie their hands as to the coal they may employ.

Again, in the later part of the paper, we see that Mr. Bowater refers to the continuous mechanical feed and coke extractors associated with continuous vertical retorts. To the best of our knowledge, no system of continuous vertical retorts has employed a continuous mechanical feed for the past twenty years; and therefore the criticism is slightly irrelevant. Again, the author suggests the possibility of carbonizing screened coal in continuous verticals, and treating the fines in intermittents. As readers of the "JOURNAL" know (see Feb. 16, p. 393), the so-called possibility is an actual fact, inasmuch as a plant along these lines, with a total gas output of 9 million c.ft. per day, is at present in course of erection for the Glasgow Gas Coporation Gas Department at their Dawsholm Works; and other investigators in this direction have given the results of experiences in papers at the meetings of the Institution of Gas Engineers.

When we turn to the test results, we find that it is claimed that those obtained under normal average operating conditions on Londonderry coal are 83·2 therms of 537 B.Th.U. gas per ton of coal as charged. The author states that the figures are, he believes, superior to any that have been obtained in other types of carbonizing plant, and he adds that "the reason for the increased gaseous therm production is at first sight not clear." A suggestion put forward by Mr. Bowater is that the increased thermal yield is due to the presence of a higher percentage of methane and unsaturated hydrocarbons. When the steaming of continuous vertical retorts came into vogue, we became accustomed to see claims for high thermal yields per ton of coal, but it was usually the case that the higher the thermal yield, the lower the calorific value. When examining figures from continuous verticals, we always felt that the yield of straight gas was not increased; the increased make of mixed gas being obtained by adding blue water gas to straight coal gas. Now there comes a claim for a static type of carbonizing plant which gives a high thermal yield without any serious reduction in the calorific value. This is a new claim, and one which in its demonstration in this country will be watched with great interest; as far as we are aware, it is a new claim even for intermittent vertical chambers. Readers may remember some classical work published in the "JOURNAL" about fifteen years ago by Dr. W. B. Davidson on his investigations of intermittent vertical retorts (see "JOURNAL," March 5, 1912, p. 664), when he obtained results for high calorific value gas as good as those from best horizontal practice; but he did not obtain better results. We do not feel that Mr. Bowater strengthened his presentation of the subject by comparing carbonization of one coal in continuous vertical retorts under average conditions with the carbonization of a different coal—Londonderry—in intermittent chamber ovens.

Well Done, Sunderland.

A GOOD lesson comes from Sunderland. It was provided last Saturday, at the auxiliary meeting of the North of England Gas Managers' Association, by the Chairman (Mr. C. F. Barrow), who is the Distribution Superintendent of the Sunderland Gas Company. His address is good and instructive reading from beginning to end. He is not dismayed by the prognostications of the section of the popular Press which likes to tickle the public imagination by extravagances such that electricity is, through the Government scheme, going to be supplied for all purposes, and in all places, at ¼d. per unit. The public are getting tired of this sort of deception—at any rate, the increasing patronage of gas does not suggest that public expectations altogether square with political and newspaper prophecy, which is repudiated by all honest electricians, who are afraid of what will happen when called upon to "deliver the goods." They are fully aware that any deception of the kind will recoil upon them; and they are getting more and more dubious as to whether the financial results of the great scheme will be in the least advantageous to them. Nevertheless, the gas industry must run no risks. It is up against assisted wiring and two-part tariffs; and in some towns these electrical business developing methods are being pushed with such vigour that they are talked over in homes and elsewhere as being something worth looking at. However, the Sunderland Gas Company are resolved that new competition methods must be similarly met; and what they have done is bringing them good success. The Company have to meet in the borough the competition of the Corporation; in the rural areas, that

of the Newcastle-upon-Tyne Electric Supply Company, Ltd. A Corporation owning an electricity supply undertaking have certain advantages in respect of position and power; but no gas company is working on right lines if it cannot oppose better value for money. And for the great majority of people, it is value for money that counts. To this the whole of Mr. Barrow's address subscribes.

The Corporation Electricity Department started what is termed a "Continuous Hire System," which applies to existing houses, and not to new ones. This suggests that the Department have a good opinion of the attractiveness of its commodity for new dwellings; but to get the old ones, which are the customers of gas, an extra attraction must be appended. They therefore evolved a scheme for houses of three, four, five, or six rooms, charging 1s. 6d. per week for the summer quarters, and 6d. per room per week for the winter quarters—that is, 1s. 6d. for three-roomed dwellings up to 3s. for six-roomed ones. For each 6d. per week rental, a unit of electricity is allowed; and all current used in excess is charged for at ¾d. per unit. If preferred, a prepayment meter can be installed, with all electricity consumed charged at 6d. Free maintenance is given to the wiring, lamps, and an electric iron. It will be seen that, excluding the cost of excess consumption, the lighting rental for a three-roomed cottage costs 19s. 6d. a quarter, or £3 18s. a year; while a six-roomed cottage, being charged in winter twice as much rental, has to pay £5 17s. a year. Against this the prepayment gas consumers get meter, fittings, and a cooker free, gas being priced at 2s. 8d. per 1000 c.ft., *plus* the extra charge. The cost for lighting alone averages only 8s. 6d. per quarter. The Corporation enlisted the services of the local electrical contractors, who sent out canvassers; but, in many cases where orders were obtained, there was a return to gas after a few weeks' experience.

The active methods by which the new competition was met by the Gas Company, and the results, are the most stimulating parts of the address; and there is good ground for heartily congratulating all concerned on the effectiveness of their plans. A direct assault on the gas business requires dealing with by equal directness. The canvassing staff was well organized and augmented, house agents and property owners were visited, the gas canvassers followed the electricity canvassers, and many orders for electricity installations were cancelled. But above all the Company have done marvellously well with an inverted burner scheme. To keep prepayment consumers from straying to electricity for lighting, a good British inverted burner was offered at a reasonable price, and payment was allowed to be made out of the rebate when collecting the money from the meters. The number of collectors was augmented; and they were given the additional work of recommending and obtaining orders for the burners. Up to date no less than 30,000 have been fixed under the scheme. The burner scheme was extended to the ordinary consumers; and, in a few weeks, 3800 had been disposed of to them. The good work is being continued. With consumers well satisfied, many of the electrical canvassers have been cleared off the road, and few orders for electrical installations are now being obtained. Mainly on the question of cost, shopkeepers, publicans, and others have been induced to return to gas, and a large welfare centre for miners has, also on account of cost been converted from electric lighting to gas. Local ironmongers, general dealers, &c., have been encouraged to become agents for gas.

That is a good tale, told in more detail in Mr. Barrow's address. What the Company are doing in maintenance, in which they have been practitioners for something like twenty-six years, is worth reading, and, where necessary, copying. They find generosity in this respect a paying business proposition. There is likewise room for admiration over the originality of the showroom window displays to which Mr. Barrow alludes in the concluding part of the address.

Institution Education Scheme.

In later columns we publish the names of the members of the District Committees which have come into being in connection with the recent revision of the Education Scheme. Students wishing for information or advice are requested to communicate with the Secretary of the Committee of the district in which they reside. In a letter accompanying the list of members of these Committees, Mr. Walter Hole, the Organizing Secretary to the Education Scheme, mentions the arrangements that have been made for the holding of the examinations next year.

Manchester Institution President's Badge.

Mr. J. Bridge, of Elland-cum-Greetland, kindly calls attention to a slip that was made in the description, on p. 605 last week, of the President's badge of the Manchester District Institution of Gas Engineers. The "Coat of Arms of the City of Leeds" should, of course, have been "Coat of Arms of the City of Manchester." Naturally this would be so, as it was in Manchester the Institution was founded, and from the city the title was derived.

Electrification of Rural Areas.

One of the strange things about the electricity scheme is that the Electricity Commissioners and the Central Board appear to be more interested in the supply of rural areas than the rural areas are themselves—in fact, they seem to be placing as many obstacles as they can in the way of consummation. In those areas they do not contemplate with the expected appreciation the disfigurement that is threatened by 80 ft. high standards and overhead cables; and there is a disinclination to think that all the capital, maintenance, transmitting, and transforming expenses can mean cheap electricity for them. A short while ago, the Electricity Commissioners issued a Memorandum, in which they tried to convince rural authorities, landowners, and others that overhead cables were not unsightly, and, combined with reasonable wayleaves, would bring valuable compensation in the availability of electricity. But much headway does not appear to have been made in placating the rural objectors. Therefore, a conference was held on Nov. 22 of the various departments, associations, &c., interested in the several aspects of rural electrical development. The matter was discussed up and down, and then the Conference appointed two Sub-Committees to investigate and report on the different branches of the problem; and other aspects of the matter were remitted to the Electrical Development Association for consideration in consultation with kindred bodies. A further meeting is to be held next March, when it is expected that a revised draft of regulations and other information on the general question will be ready for consideration.

Compulsory Trade Union Membership.

The Trade Disputes Act has made it illegal for any local or other public authority to cause it to be a condition of employment of any person that he should, or should not be, a member of any trade union. The first case under this provision has been heard at the Birkenhead County Court, when an electrical worker, named Stafford, sought to recover four-and-a-half weeks' wages, and a declaration that the Corporation acted unlawfully in dismissing him because he did not belong to a certain trade union (the Electrical Trades Union), and an injunction restraining them from so acting in future. Judge Whitmore Richards, in giving judgment, stated that there had been a violation of the Act. Plaintiff was entitled to a declaration, and there would be liberty to apply for an injunction, which he hoped would not be necessary.

The Factories Bill.

Latterly there have been several discussions between the Home Office and representatives of different organizations of employers regarding the proposals in the Factories Bill, which is to be included in the Government programme next session. The Home Office consider the fears are unfounded that the measure will place heavy new burdens upon industry, and that such practical difficulties as may be brought to light in the course of the preliminary consultations can be met when the present draft of the Bill is finally revised.

New Spirit in Industry.

The National Union of General and Municipal Workers have been interesting themselves in the labour policy of the

Directors of Imperial Chemical Industries. We referred to this development in the "JOURNAL" for Nov. 2; and it will be remembered that one of the important features is the method by which the Directors are encouraging the workers to become holders of capital in the concern. To discuss the proposals, there has been a conference between representatives of the Union and of the Company—for the Union, the Rt. Hon. J. R. Clynes, M.P., Mr. Will Thorne, M.P., and others; for the Company, Sir Alfred Mond, M.P. (Chairman), Sir Harry McGowan (President), and other members of the Board, with Mr. R. Lloyd Roberts, the Company's Chief Labour Officer. After full explanation and discussion of the new policy, Mr. Clynes, on behalf of his colleagues, stated that it was the intention of the Union to co-operate in every possible way in the administration of the new policy. That is very gratifying.

But Caution.

The trade unions, however, intend to exercise care, and are pursuing a conditional course. Great interest has been shown in the invitation to a conference received by the General Council from a representative group of employers. The disposition appears to be favourable, so long as the operative power of the unions in respect of legitimate functions is not undermined. This trend is illustrated by a resolution passed by the Council of the National Union of General and Municipal Workers. It lays down the principle that the trade union movement should not be committed to any plans which might not be in the highest interests of the wage-earning classes, or which might limit the freedom of trade unions to secure better conditions for their members. "The Union does its best to arrange settlements with employers as wage conflicts arise, but would not approve any settlement with groups of employers which would bind workmen to existing conditions of labour, or present rates of pay." It is also reported that the General Council have expressed the view that organized labour could not accept any further reduction of wages or extension of working hours as a condition of any industrial compact.

National Health Insurance.

In the House of Commons last week, the Minister of Health (Mr. Neville Chamberlain) stated, in answer to a question, that the various recommendations of the Royal Commission on National Health Insurance had been exhaustively discussed with the Consultative Council of Approved Societies. As a result, it is intended to take the first convenient opportunity of introducing an amending Health Insurance Bill, embodying most of the recommendations of the Royal Commission.

PERSONAL.

Among the Sectional Presidents appointed for next year's meeting in Glasgow of the British Association for the Advancement of Science is Prof. A. SMITHELLS, Section L (Education).

The minutes of Committees of the Rotherham Borough Council contain the announcement of the retirement on superannuation, on account of ill-health, of Mr. J. S. NAYLOR, the Gas Engineer and General Manager.

In the "JOURNAL" for Sept. 21, it was announced that Mr. ROBERT H. BROWN, formerly of Birkenhead, had been appointed Engineer and Manager to the Town Council of Johannesburg. This, it appears, was a little premature. We now learn that Mr. Brown was unable to accept the appointment.

Mr. JOHN S. HALL, the son of Mr. John E. Hall, Engineer, Manager, and Secretary of the Prescot Gas Company, has been appointed Assistant Manager to the Company. Mr. Hall, Jun., was educated at the Prescot Grammar School and Manchester School of Technology. He served an apprenticeship with Messrs. R. & J. Dempster, Ltd., of Manchester, and has since been a member of their staff.

The interesting circumstance that Sir ALBERT BALL has now entered upon the twenty-first year of his chairmanship of the Nottingham Corporation Gas Committee recalls the fact that it has been largely due to his discriminating guidance, combined with the resourceful work for which during the greater part of the period Mr. John Wilkinson has been responsible, as Engineer and Manager, that such excellent results have been accomplished in connection with the gas undertaking. Sir Albert has consistently maintained a policy of development of efficient working arrangements; it having been under his chairmanship that Glover-West vertical retorts were established at Radford, and others of the Woodall-Duckham type at the larger carbonizing station at Basford. It is generally felt in Nottingham that ratepayers—and consumers of gas in particular—are under a great obligation to Sir Albert, who, apart from his chairmanship of the Gas Committee, has rendered invaluable service in other departments of municipal activity.

After being associated with the Slough Gas and Coke Company for a period extending over half a century, Mr. ARTHUR THOMAS has tendered his resignation. This has been received by the Directors of the Company with regret. Though Mr. FRANK THOMAS, who has been Assistant Secretary for many years, has been appointed to succeed his father, Mr. Arthur Thomas still remains as Consulting Secretary, so that his valuable advice will be available if required. The Directors felt they could not part with such a faithful servant without some tangible acknowledgment of their appreciation of his services, and an interesting ceremony took place in the Board Room on Nov. 29, when Mr. Thomas was presented with a handsome oak case chiming clock, on which was inscribed on a silver plate: Presented to Mr. Arthur Thomas by the Directors of the Slough Gas Company in appreciation of his 53 years' faithful service as Secretary to the Company. The presentation was made by Mr. R. V. Elvey, Chairman of Directors, in the presence of all the Directors, Mr. Frank Thomas, and Mr. H. Wilkinson (Engineer).

OBITUARY.

We regret to learn of the death, on the 28th ult., of Mr. THOMAS ARMITAGE ORME (at the age of 52 years), of Messrs. George Orme & Co. (Meters Ltd.).

It is with the greatest regret that we have to record the death of Mr. GEORGE MARSHAM, C.B.E., J.P., D.L., C.A., the Chairman of the Maidstone Gas Company. A cousin of the 4th Earl of Romney, Mr. Marsham was born in 1849, and was educated at Eton and Merton College, Oxford. He played cricket for Kent in 1876 and 1877, and during all his long life was the mainstay of the Kent County Cricket Club. From quite early life he engaged in county and other public work. After being an active member of the Quarter Sessions since 1873, he was elected a member of the Kent County Council at its foundation in 1889, was Vice-Chairman from 1890 to 1900, and Chairman from 1900 to 1910, when he resigned. Previously he had been Chairman of the Finance and Weights and Measures Committees. Another Committee in connection with which Mr. Marsham did valuable work was the Education Committee. Mr. Marsham's great services to the county in many spheres of public work were recognized on his retirement from the Chairmanship by the presentation portrait which hangs in the Council Chamber at the Sessions House. A gift of plate was also made to him, as well as a replica of the picture. Mr. Marsham continued to serve as a member of the County Council until 1925, when he resigned. During his whole period of service on the County Council he was an Alderman. He was appointed an Auditor of the Maidstone Gas Company in 1878, and in 1882 was made a Director, becoming Chairman in 1900. He was Chairman of the Maidstone Branch of the Royal Insurance Company, a Director of the Maidstone Water-Works Company, and President of the Kent Association of Workmen's Clubs and Institutes. He was formerly Chairman of the Board of Management of the West Kent General Hospital, and was deeply interested in many philanthropic organizations in and around Maidstone. His commanding presence and genial personality will be greatly missed by a very large circle of friends throughout the county. Respected and beloved by all who knew him, he will be greatly missed by the staff and workmen of the Maidstone Gas Company, whose devoted esteem he had won by his exceptional qualities and abilities, and by his many acts of consideration and kindliness. His nephew, Major C. H. B. MARSHAM, has been elected a Director of the Maidstone Gas Company, and thus the Marsham tradition is happily continued.

High-Temperature Insulation.—A highly interesting pamphlet bearing this title has been compiled by the Celite Products Corporation, of Windsor House, 46, Victoria Street, S.W. 1. Heat balance-sheets in industrial operations clearly demonstrate the large proportion of the heat generated which is lost by conduction through, and radiation from, the walls and other exposed surfaces of various types of equipment; and in their booklet Celite Products explain how these losses can be reduced. Diagrams show the temperature gradients and heat losses per sq. ft. per hour through uninsulated walls and through walls of "Sil-o-Cel" insulating brick.

ELECTRICITY SUPPLY MEMORANDA.

THE interruption of the work of Parliament by the failure of the electric light (referred to in our editorial columns last week) has caused pertinent questions to be asked in the House. The members generally do not like such pranks being played by a lighting agent on the Houses of Lords and Commons; and they are anxious that nothing of the kind shall be repeated, or, if there is a breakdown, that there shall be ready for action an alternative system of illumination. Better behaviour has been promised for the future. The House of Commons, in fact, has been assured by Sir Vivian Henderson, on behalf of the First Commissioner of Works, that, in normal circumstances, there would have been available an alternative source of supply; but, unfortunately the gear for switching-over was not in operation, owing to alterations in progress in connection with the linking-up of various London stations. This very fact is testimony to a congenital weakness of electricity; and in the attempt to counteract it more or less satisfactorily, a heavy expense has to be incurred. Even the power station, it is now disclosed, was without light; and the change-over had to be effected by hand in the darkness. Two years ago the First Commissioner considered the advisability of installing an independent stand-by electricity generating set in the Houses of Parliament; but, apart from the need for economy (fancy speaking of "economy" in such a matter), the assurances given by the Electricity Company convinced the First Commissioner that such an installation was unnecessary. His conviction was misplaced; and he will probably now be secretly a bit suspicious (notwithstanding his public professions) of electrical assurances—even of the new one, that once the generating stations are linked-up, a complete failure of the supply will be "practically impossible." In the meantime, it is said, every possible step will be taken to prevent a recurrence of the trouble. "Every possible step!" The best step would be either to have gas reinstated, or to put in a private gas-driven electricity generating set. This might prove highly economical—at any rate, there would be greater safety than with the current coming from a more distant source. Another remark of Sir Vivian was that "to instal gas, would not only be expensive, but would not meet the requirements of the case, as (mark this!) electricity is necessary both for the ventilation of the Houses and for smoke extraction." Gas was installed for lighting for the best part of a century, and never failed. The reason given that electricity is required for ventilation and smoke extraction is a poor one. It is lighting that is in question. Electricity for ventilation and for dealing with the prolific smoke emanations from the combustion of tobacco by members of the Houses could still be dealt with by electric fans.

Parliament and the Need for Alternative Lighting.

According to London correspondents of provincial daily papers, the members of both Houses are taking the collapse seriously to heart. At first there were some noble lords and honourable members who thought there had been some foul play or a stupid trick. One member of the Upper House suspected some "dastardly outrage." The only "outrage" was perpetrated by electricity itself, which has led (so one London letter avers) to "a strong demand from all parties that there should be an immediate inquiry into the lighting arrangements of the House, and measures be put in hand to prevent a repetition of the experience." "It is recognized," the writer adds, "that, in the time of crisis or industrial upheaval, a sudden failure of the electric light might create something like a panic in the Debating Chamber." The inefficiency, or rather absence, of arrangements for an emergency of the kind was amply demonstrated to the members of the House of Commons by (as another writer puts it) "the tardy appearance of a few guttering candles." Somebody deserves to have his knuckles rapped over this. There has been evidence enough in the country of the fickleness of electricity as an illuminant; and for the Houses of Parliament to be left at its mercy without the adequate provision of a substitute for use in the event of a breakdown shows a want of practical observation and due heed of luxuriant lessons.

Friend Candle.

When consideration is given to the outcry that is being made by the owners of electricity undertakings in London and the South-Eastern area of the country in conjunction with the recent Presidential Address to the Institution of Elecrtical Engineers of Mr. Archibald Page, Chief Engineer to the Central Electricity Board, strong support for the objectors is found in the address. Nevertheless, the dissatisfaction, as was learned from the discussion in the House of Lords (referred to in our editorial columns last week), will not move the Central Electricity Board to have a public inquiry. Mr. Page, it will be remembered, was beautifully candid in his address. Centralization of generation and the "grid," he admits, are not going to improve the efficiency of generation in certain areas of the electric power companies and larger municipalities; it is not going to reduce the price of electricity for lighting in the cities and large towns; and it will not create a new electrical heaven, nor give ninepence for fourpence. Then why the great electrical upheaval? In a letter by Mr. W. Gentry Bingham, M.A., in the "Electrician," he refers to Mr. Page's address as a crushing exposure of the pretensions put forward in support of the passing of the Act. Everything possible was done at that time to ignore competent technical advice and criticism outside the experts in the employ of the Government; there appeared, in fact, to be a lofty contempt of all that was advanced by the most eminent of electricians unattached to Government service. Even now there is an obvious desire to avoid publicity by open investigation of the criticisms it is desired to make on the second of the two schemes put forward by the Electricity Commissioners, and at present under the examination of their colleagues, the Central Electricity Board. Mr. Bingham appears to write in righteous indignation. He says: "Conceive now the dismay of the Government and their dupes that the voice of science has, nevertheless, made itself heard in condemnation. Conceive the horror of Parliament at the discovery that, heedless of remonstrance, it has floundered into a veritable bog in pursuit of the will-o'-the-wisp. Conceive, if you can, the disgust of the deluded public now that it has learned the truth." And the spending of millions upon millions is to continue. Knowing a little about Parliament, we find it difficult to conceive its "dismay" or its "horror." Something more than this electrical mess is required to dismay and horrify it. The "Electrician" appends a footnote to Mr. Bingham's letter. This contemporary, if we remember rightly, was the only one of the technical papers which backed-up the Government scheme for the wonderful things it was going to perform for electricity. It now says to its correspondent: "We do not think that the Act *per se* was responsible for the mistaken views held by a large section of the general public. Surely the attempts at intelligent anticipation made by certain of the popular newspapers must be held to be mainly responsible." That is somewhat feeble for a paper which was so enamoured of the scheme for the benefits it thought it was destined to confer. And as to the "intelligent anticipation," which was more idiotic than "intelligent," the popular newspapers, we are afraid, took their cue from the politicians. We do not suggest they read the "Electrician."

To What End?

There are conditions of electricity's use in which the tenants of dwellings must not exercise freedom, but must consume reasonably and judiciously. We have seen a good deal of this sort of restriction under the fixed price system of electric lighting, and in connection with the time-use of current for water heating, &c. The tenants of the Hull Corporation houses have been using electricity not only for the lighting for which it was intended, but for other purposes. It is alleged that the effect is to reduce the intensity of the lights of the other tenants, who, being good themselves, do not like the greed of their neighbours. Mr. Joseph Ward is a member of the Town Council, and is likewise a tenant of a Corporation house; and he told the Electricity Committee that the light in his home was so dim that he could not read by it. The Electricity Engineer states that steps are being taken to check the practice and the prodigality of the naughty tenants. It serves them right. But why use electricity? Is it a matter of compulsion? If gas were used, the tenants could burn as much as they liked through prepayment meters. No restriction, good efficiency, and an acceptable economy.

Prodigal Tenants.

During the torrential rains in London last week, Mill Hill and part of Hendon were in darkness for three hours, owing to the flooding of two sub-stations of the Hendon Electric Supply Company. Last Saturday week parts of East Birmingham were inconvenienced through the breakdown of the electricity supply. Voting was taking place in the municipal by-election in the Washwood Heath Ward; and, during the last half-hour of the voting, other illuminants had to be employed. At the cinemas programmes were abruptly ended. The Shipley electricity supply failed in the district of Bradford Road South East and Bingley Road North last Saturday night owing to a faulty cable. Householders and tradespeople had to resort to candles. In some cases the light was restored in half an hour; but in others three hours passed before the supply was resumed. The Gabalfa Baptist Chapel, Cardiff, was saved from possible destruction last week by the prompt action of the caretaker, who, on entering the chapel, discovered it full of smoke. It was found to be due to the fusing of an electric wire behind the organ. The Fire Brigade quickly ended the trouble.

Mishaps.

Mr. John Melrose, C.B.E., late Provost of Hawick, and Chairman of the Hawick Gas Light Company, left personal estate of the gross value of £13,310.

THE INSTITUTION EDUCATION SCHEME.

District Education Committees—1928 Examinations—Courses for Teachers.

We have received the following letter from Mr. Walter Hole, Organizing Secretary to the Institution Education Scheme, together with information as to the composition of the new District Committees.

District Education Committees.

SIR,—The appointment of the District Education Committees, decided upon in connection with the recent revision of the Education Scheme, has now been completed, and I have pleasure in forwarding the list herewith for publication.

Students wishing for information or advice are requested to communicate with the Secretary of the Committee of the District in which they reside, who will be pleased to give or procure all necessary guidance.

1928 Examinations.

The whole of the external examinations and the Higher Grade internal examinations in Gas Engineering and Gas Supply will be held on Saturday, April 28, the Ordinary Grade from 2 to 5 p.m. and the Higher Grade and Diploma from 2 to 5 and from 6 to 9 p.m. All applications to sit for the external examinations must reach the Organizing Secretary on or before Feb. 28.

Courses for Teachers.

It is hoped and expected that a Course for Teachers of Gas Engineering and Gas Supply will again be held next year at the same place and at about the same time as that of July, 1927. Further particulars will be published as soon as possible.

WALTER HOLE,
Organizing Secretary.

Wharfedale, Barton,
Torquay,
Dec. 2, 1927.

DISTRICT COMMITTEES.

Formed in accordance with Clause 5 (*c*), p. 9, of the revised regulations.

(S) = Representative of Senior Association.
(J) = Representative of Junior Association.
(B) = Representative of Board of Education, or Scottish Education Department.
G.E.C. = Gas Education Committee.

EASTERN DISTRICT.

(S) F. Prentice, Ipswich (Chairman).
(S) F. G. Brockway, Cleethorpes.
(S) A. G. Gregory, Harwich.
(S) E. W. Smith, Chelmsford (Deputy District Representative on G.E.C.).
(S) E. F. Keable, Gas-Works, Gorleston-on-Sea (Secretary and District Representative on G.E.C.—specially representing the Juniors in the absence of a Junior Association).
(B) J. O. Peet, H.M.I., Lincoln.

IRISH COMMITTEE.

(S) J. D. Smith, Belfast (Chairman and Representative on G.E.C.).
(S) W. L. Dalby, Wicklow.
(S) H. W. Saville, Wexford.
(S) George Airth, Gas-Works, Dundalk (Secretary).

LANCASHIRE DISTRICT.

(S) W. Buckley, Droylsden.
(S) G. Dixon, B.Eng., Lancaster.
(S) W. J. Smith, B.Sc., Bolton.
(S) S. Tagg, Preston (Chairman and District Representative on G.E.C.).
(J) J. Alsop, Gas-Works, Lum Street, Bolton (Secretary).
(J) W. H. Battersby, Bury.
(J) H. J. Hailstone, Rochdale.
(J) F. B. Small, Liverpool.
(B) C. H. Creasey, H.M.I., Marple.

MIDLAND DISTRICT.

(S) F. C. Briggs, Dudley (Chairman and District Representative on G.E.C.).
(S) W. G. S. Cranmer, Willenhall.
(S) C. F. W. Rendle, Redditch.
(S) A. R. W. Roberts, Hereford.
(J) H. R. Hems, Industrial Heating Section, Gas Department, Council House, Birmingham (Secretary and Deputy District Representative on G.E.C.).
(J) W. MacNaughton, Wolverhampton.
(J) R. G. Marsh, Birmingham.
(J) W. L. S. Spinks, Birmingham.
(B) G. W. Hefford, H.M.I., Birmingham.

NORTH OF ENGLAND DISTRICT.

(S) C. Dru Drury, Sunderland (Chairman and District Representative on G.E.C.).
(S) N. S. Cox, Sunderland.
(S) Dugald Currie, South Shields.
(S) H. Lees, Gas-Works, Hexham (Secretary and Deputy District Representative on G.E.C.).
(S) F. P. Tarratt, Newcastle-upon-Tyne.
(J) G. E. Anderson, Wallsend-on-Tyne.
(J) W. Batt, Newcastle-upon-Tyne.
(J) L. M. Weldon, West Hartlepool.
(B) S. H. Stelfox, H.M.I., Leeds.

SCOTTISH COMMITTEE.

(S) Thomas Gray, D.Sc., Glasgow (Chairman).
(S) James Campbell, Dunfermline.
(S) David Fulton, Gas-Works, Helensburgh (Secretary and District Representative on G.E.C.).
(S) H. H. Gracie, Edinburgh (Vice-Chairman and Deputy District Representative on G.E.C.).
(J) James Hall, Glasgow.
(J) John Murray, Glasgow.
(J) E. L. Farquhar (Kennoway).
(J) D. Yule, Alloa.
(B) J. T. Ewen, H.M.I., Pitscandly, Forfar.

SOUTHERN DISTRICT (EASTERN AREA).

(S) L. Trewby, Finchley, N. 3 (Chairman).
(S) L. G. Humphrys, Bexhill-on-Sea.
(S) E. Scears, Redhill (District Representative on G.E.C.).
(S) R. H. Ruthven, Ramsgate.
(J) A. Broadbent, West Ealing, W. 13.
(J) W. T. Kenshole, Gas-Works, Lea Bridge, Essex (Secretary).
(J) L. Lacey, B.Sc., Harrow.
(J) A. Tennant, Croydon.
(B) Dr. A. Morley, H.M.I., Board of Education, Whitehall.

SOUTHERN DISTRICT (WESTERN AREA).

(S) R. Robertson, Bristol (Chairman and District Representative on G.E.C.).
(S) W. E. Dean, Exmouth.
(S) P. S. Hoyte, Plymouth.
(S) W. N. Westlake, Exeter.
(J) T. L. Armitage, Cheltenham.
(J) S. Hole, 6, Coronation Road, Park Lane, Bath, Somerset (Secretary and Deputy Representative on Gas Education Committee).
(J) A. Marsden, F.I.C., Bristol.
(J) J. T. S. Spencer, Weston-super-Mare.
(B) A. Coulson, H.M.I., Bristol.

WALES AND MONMOUTHSHIRE DISTRICT.

(S) H. D. Madden, Cardiff (Chairman).
(S) J. H. Canning, Newport, Mon. (District Representative on G.E.C.).
(S) H. W. Webb, M.Sc., Cardiff Technical College (co-opted).
(S) J. Mogford, Llanishen.
(S) O. Thomas, Gas Office, Pentre, Rhondda (Secretary and Deputy District Representative on G.E.C.).
(J) B. J. Bell, Cardiff.
(J) T. V. Blake, Cardiff.
(J) C. B. Felton, Newport, Mon.
(J) A. E. Martin, Merthyr Tydfil.
(B) Dr. C. G. P. Williams, H.M.I., Cardiff.

YORKSHIRE DISTRICT.

(S) J. Bridge, Elland (Chairman and District Representative on G.E.C.).
(S) J. E. Lister Cooper, Yeadon.
(S) F. H. Robinson, Harrogate.
(S) C. W. Ward, Wakefield.
(J) C. H. Chester, Vicarage Street Gas-Works, Wakefield (Secretary).
(J) S. T. S. Musgrove, Sheffield.
(J) C. T. P. Roper, Bradford.
(J) R. N. Webb, Leeds.
(B) John Wilson, H.M.I., Leeds.

FORTHCOMING ENGAGEMENTS.

Dec. 8.—BRITISH COMMERCIAL GAS ASSOCIATION.—Midland District Committee, at Birmingham.

Dec. 10.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Visit to the Granton Gas-Works, Edinburgh.

Dec. 13.—NATIONAL GAS COUNCIL.—Meeting.

Dec. 13.—FEDERATION OF GAS EMPLOYERS.—Meeting.

Dec. 14.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at No. 28, Grosvenor Gardens, S.W. 1, at 2.30.

Dec. 15.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting at the Council House, Birmingham. Paper by Mr. J. S. Hayward (Industrial Heating Section, Birmingham) on "The Heat Insulation of Materials."

Dec. 16.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute, 7.30. Paper by Mr. J. M. Loughland on "Gas-Fired Fish-Frying Ranges."

Dec. 17.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting at Brighouse. Paper by Mr. W. E. Stephenson, of South Bank, on "Incidentals in the Manufacture of 400 c.v. Gas." Inspection of the works.

INSTITUTION OF GAS ENGINEERS.

Dec. 12.—Emergency Committee.
Finance Committee.

Dec. 13.—Education Committee.

POTENTIAL INVESTMENTS.

IV.—THE NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

The Newcastle-upon-Tyne and Gateshead Gas Company has a statutory area of supply of 166 square miles, and comprises Newcastle, Gosforth, Longbenton, Newburn, Prudhoe, Weetslade, Wallsend, Chester-le-Street, Cramlington, Gate-head, Blaydon, Felling, Ryton, Whickham, and part of Hebburn. The population of the whole area is about 688,000, and the Company has 153,284 consumers. During the year 1926 the sales of gas exceeded 4337 million c.ft., equalling 21,687,474 therms. The Company was incorporated by Special Act of Parliament in 1864, and further powers were obtained by various Acts between the years 1866 and 1924. In October of the current year a provisional agreement was entered into with the Tynemouth Gas Company for the amalgamation of the two Companies subject to the necessary Order being obtained from the Board of Trade under the Gas Regulation Act. The Tynemouth Company has an area of 26½ square miles, which includes the Borough of Tynemouth, Whitley Bay, and Monkseaton, Earsdon Urban District, and Seaton Delaval Urban District. The population of the area is about 90,000. Services number about 26,000.

The capital of the Newcastle Company as shown by the last accounts is as follows:

	£
4 p.ct. preference stock (including £29,777 added on conversion)	360,929
Ordinary stock (3½ p.ct. standard dividend—including £896,461 added on conversion)	2,061,315
Premiums received amount to	401,714
Remaining unissued	433,215
Making the total authorized capital	£3,257,173

The unissued capital can be raised as ordinary stock or as redeemable or irredeemable preference stock (dividend not to exceed 7 p.ct.).

Amounts Borrowed.

	£
The loan capital is as follows:	
Debenture stock (perpetual) 3½ p.ct.	691,705
,, ,, (redeemable 1928) 5 p.ct.	271,740
,, ,, (,, 1932) 5 ,,	76,086
	£1,039,531
Less discounts	69,656
	£969,875
Amount remaining to be borrowed	169,180
Total borrowing powers	£1,139,055

Transfer arrangements—common form. Fee for registration of transfer, probate, death in joint holdings, marriage, power of attorney, or distringas, 2s. 6d. All classes of stock can be transferred on same deed without extra fee and in amounts and multiples of £1. Husband's witness of wife's signature, and *vice versa*, accepted. Voting—£30 ordinary or preference stock, 1 vote; £150, 2; £300, 3; £500, 4; £700, 5; £1000, 6 votes. Director's qualification, £2000 ordinary stock.

Accounts and dividends—Accounts are made up to Dec. 31 and submitted in February; dividends (ordinary and preference) being paid in August and February. The standard price of gas is 11d. per therm (Board of Trade Order made Dec. 23, 1923). The present selling price is 8·6d. per therm, and the declared calorific value is 500 B.Th.U. per c.ft. Dividends on the ordinary stock are subject to sliding scales—viz., ½d. per therm charged above or below the standard price equals ⅛ p.ct. per annum variation in the authorized dividend.

The following table illustrates the progress made by the Company since the year 1903. The period of the war and the few following years have been purposely ignored owing to the abnormal conditions then prevailing:

Year.	Average Price of Gas per 1000 C.Ft.	Quantity Sold. Million C.Ft.	Capital Expended per 1000 C.Ft. Sold.	Gross Profit.	Total Charge for Capital. (See Note.)	Rate of Ordinary Dividend. P.Ct. per Annum.	Amount Carried Forward and Balance Reserve Fund.
	s. d.		s. d.	£	£	£ s. d.	£
1903 .	1 10	2,730	13 0	116,067	91,409	4 10 0	52,135
1908 .	1 10	2,967	14 11	92,196	110,242	4 11 3	60,547
1913 .	1 10	3,291	14 9	125,852	116,441	4 10 0	90,824
	Per Therm. d.	Therms.	Per Therm. s. d.				
1923 .	9·25	17,176,052	3 0	172,714	149,672	5 0 0	98,619
1924 .	8·6	19,964,225	2 10	158,159	156,429	5 0 0	139,200
1925 .	8·6	21,175,004	2 9	156,915	159,917	5 0 0	140,057
1926 .	8·6	21,687,474	2 8	110,309	160,273	5 0 0	94,163

NOTE.—Total charge for capital includes dividend and interest paid and amount (if any) carried to reserve fund.

While for the year 1926 the percentage that the total charge for capital bears to the capital—5·59 p.ct.—is quite a reasonable one, the cost per therm sold (1·77d.) is above the average, especially for a provincial company. This is attributed by the Company to be due to the low average consumption per meter brought about by the old custom of granting free coal to miners in the district. The growth of business, however, is very satisfactory; the increase in the gas sales since the year 1903 being over 51 p.ct.

The coal stoppage of last year naturally adversely affected the profits; and as the Company did not increase the price of gas, the balance in hand is at a much reduced figure. It is probable that the output of the Company benefited by the strike. The prospects for the current year are exceedingly good, and it is confidently expected that a substantial balance of profit will be obtained.

The ordinary and preference stocks are quoted in London and Newcastle, and the ordinary only at Manchester. The following table shows the prices of the highest and lowest transactions in the ordinary stock on the London Exchange, the dividends paid, and the yield on the average price during the past four years:

Year.	Transactions. Highest.	Transactions. Lowest.	Dividend P.Ct. per Annum.	Yield P.Ct. per Annum.
			£ s. d.	£ s. d.
1923 .	87¾	79	5 0 0	5 19 11
1924 .	85¼	82	5 0 0	5 19 7
1925 .	84	69¾	5 0 0	6 10 1
1926 .	73	68¼	5 0 0	7 1 0
To-day .	Average 74		5 0 0	6 15 2

Slightly higher prices have to be paid in Newcastle; to-day's price being 75¼. The authorized dividend for the current half-year is £2 10s. p.ct.; and it will be seen that the stock is a very attractive investment. The 4 p.ct. preference stock at 70 yields £5 14s. 3d. p.ct. per annum.

THE RIDDLE OF AN EXPLOSION.

By NORTON H. HUMPHRYS.

The following remarks are submitted in response to the editorial comment (*ante*, p. 518) on the bursting of a 24-in. gas main as described on p. 537 of the "JOURNAL" for Nov. 23; and on the need for free publicity in connection with so-called explosions of gasholders (p. 517), which might also apply to spontaneous combustion in the purifier house.

An official silence conveys an uncomfortable impression of fault somewhere which either involves professional or personal discredit, or suppresses evidence that might be useful to claimants for damages to life, health, or property. A plea of absolute ignorance is a sad confession of weakness. And unfortunately a more or less competent discussion of the causes among interested members of the public cannot be so simply evaded. In all parts of the country, the gas engineer is being pressed for explanations by anxious directors, shareholders, and domestic residents who enjoy the privilege of including a gasholder or a gas-works among their near neighbours. His knowledge and experience may admit of a more or less sound and satisfactory reply, but he is under the disadvantage of possessing no first-hand acquaintance with the whole of the facts. He cannot provide more than an informal opinion which is widely published and possibly finds its way into the columns of the Daily Press. The profession and the public would be benefited by the free publication of correct and complete information, and the possibility of injury to the parties immediately concerned is remote.

The bursting of the 24-in. main suggests many reflections relating to the possible formation of spontaneously inflammable compounds in pipes, the importance of efficiently cleaning the interior surface of a main before turning gas into it, and the methods generally observed when charging a new main. One explanation of the first point is obvious to all who have dabbled in popular chemical experiments, which may include preparation of a pure metal in an extremely finely divided condition. When injected into the atmosphere by a smart jerk of the containing tube, a brilliant mass of incandescent matter, due to the rapid combination of the metal with oxygen, is im-

mediately produced. The greater part of the constituents included in the analysis of the deposit found in the main consists of alkaline carbonates which may be at once ruled out of court as non-combustible; but suspicion attaches to the organic matter and the metal oxides. One method of obtaining the metal in the desired condition was the preparation of a salt containing an organic acid capable of decomposition under moderate heat. We may therefore assume that the action of the draught of air sent through the pipe set-up some obscure chemical action and liberated metal in a very finely divided form, which became incandescent, and fired an explosive mixture of gas and air which unfortunately existed at the moment in its vicinity.

Apparently an explosion presenting variable intensities of force, due to varying proportions of gas and air, was spread over a considerable length of pipe; but the strongest was confined to a small area in the locality indicated by the burst. The quantity of force required decisively to tear out a section measuring 7 ft. by 15 in. from a pipe not much less than 1 in. in thickness is something enormous, and a mixture not far removed from 10 : 1 must have obtained at this point, perhaps tapering-off in each direction.

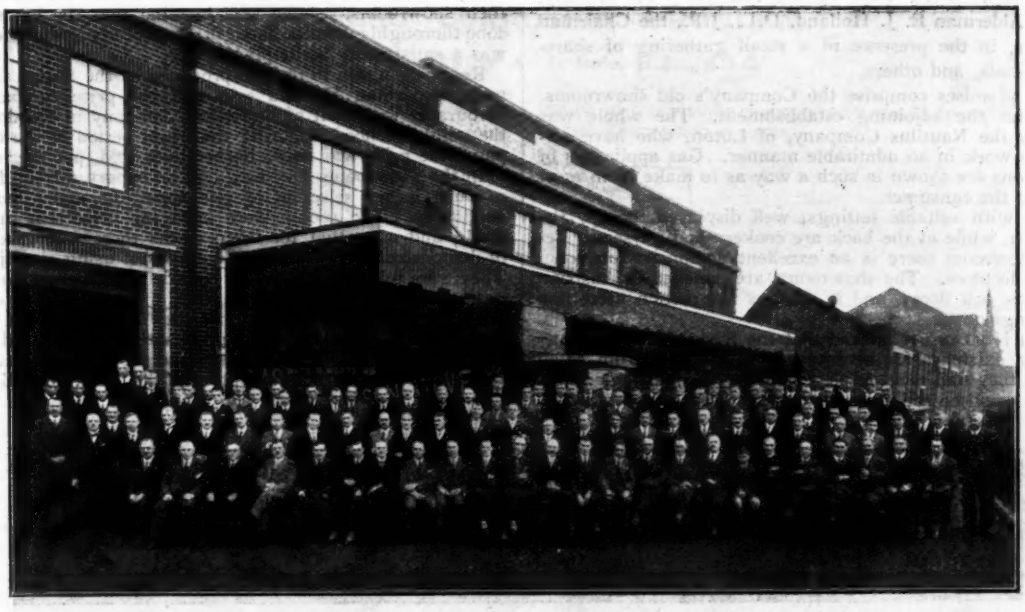
The cleaning or sweeping out of pipes before laying is too frequently limited to a single passage of a wire brush from one end to the other, without regard to the fact that the object sought is not merely to detach, but also completely to remove, dust and loose scale from the interior of the pipe. The brush should be followed by a rubber or other disc which fits closely, and will drive even the finest dust before it. Without this precaution, the finest dust is the more likely to remain. This applies especially to second-hand pipe, or new ones that have been held in stock for a considerable time.

Experience extending over many years supports the opinion that if a larger outlet, which means a more rapid clearance, had been used, the disaster would have been avoided. The air should be *displaced*, not mixed; and the quicker the clearance the less the risk of explosive mixtures and the smaller the waste of gas. The quicker the rate of travel, the more efficient will be the sweeping action and consequent removal of fine dust if present.

Observations conducted with the aid of a specific gravity effusion test at the discharge end prove conclusively that the slower the rate, the greater the loss of gas and the risk of forming explosive mixtures. With a full gasholder pressure and a large discharge vent, the gas and air have slight opportunity for mixing, and pipes have thus been cleared, even when the discharge end is near to houses, without complaint. But if the main is closed with the exception of a small stand-pipe, perhaps 1 to 2 in. in diameter, the clearance will be more prolonged and more gradual.

Sometimes the gas is ignited, on the end of the stand-pipe, at the earliest moment when it can be considered reasonably safe to do so, in order to avoid the smell of escaping gas. But the box of matches is better left in the tool cabin. The specific gravity effusion test is an excellent substitute.

MIDLAND JUNIORS AT THE PARKINSON GAS-STOVE WORKS.



About 100 members of the Midland Junior Gas Association paid a visit to the Stechford Works of the Parkinson Stove Company, Ltd., on Saturday, Nov. 26.

Before being conducted round the works, a short paper was read by Mr. L. Davy (the Works Manager) on "Fuel Consumption in Cupola Practice." The author dealt with the design of cupolas, illustrating his remarks by reference to specially prepared drawings. He outlined a heat balance, and went thoroughly into the method of heat employment in cupolas, the correct charging of pig, scrap, coke, and limestone, and the general methods of firing, with figures of fuel consumptions which would be expected from various sizes of cupolas on the production of light and heavy castings. Mr. Davy also gave information regarding tuyeres, their size, shape, position, and number required for efficient working. The remainder of the paper was devoted mainly to "manipulation;" the author giving, from his wide experience, valuable hints in connection with the operation of cupolas.

The party were then conducted round the works, a short description of which, with photographs, was published last week (pp. 622-3). At the conclusion of the inspection, the visitors were entertained at tea on the invitation of the Directors of the Company.

Mr. D. M. GIBB (the General Manager), in welcoming the Juniors, said how pleased they were to have been able to afford them an opportunity of inspecting the works. It was five years since the Midland Juniors were there last; and he had no doubt they had seen much that was new to interest them. The firm had several fresh developments coming forward; and he hoped that the Association would take an opportunity of paying a further visit in the near future.

Mr. H. R. HEMS (President) proposed a vote of thanks to the Directors, Mr. D. M. Gibb, Mr. L. Davy, Mr. Jordan, Mr. G. Wilkes, and other members of the firm who had done so much to make the visit such a success. He said that a great deal had happened during the five years since the Association last visited the works; and he congratulated the Company upon the developments and extensions which had been made. Increased business had demanded these extensions; and it spoke well for the progress not only of the Parkinson Stove Company, but of the whole of the gas industry.

Mr. C. F. TOOBY seconded the vote.

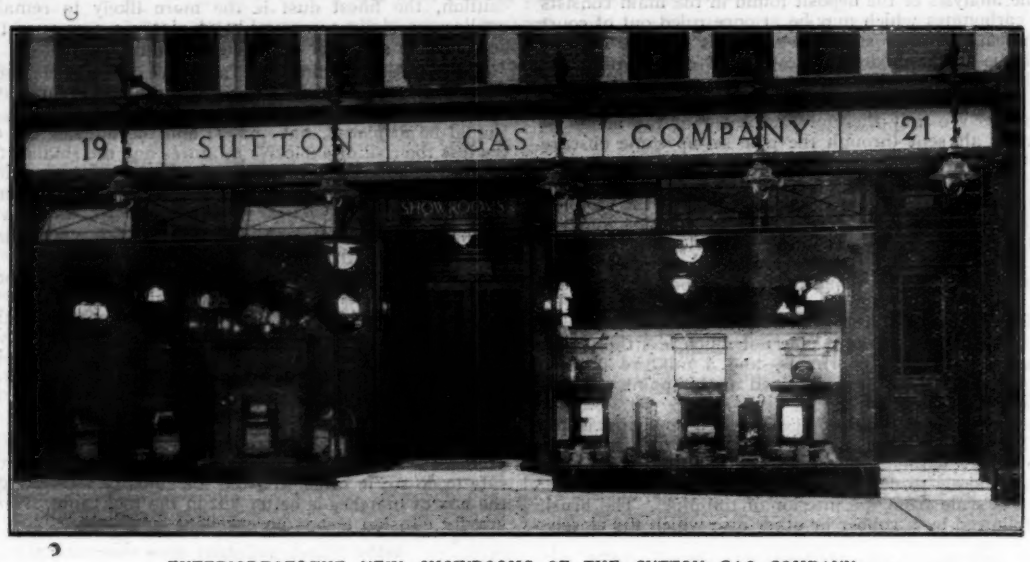
After tea, questions were invited upon Mr. Davy's paper, and a short but interesting discussion took place.

Gas Oil Imports.

Imported gas oil shows a considerable decline as compared with the coal stoppage period. In October, 7,250,506 gallons were received, as against 16,892,717 gallons in 1926. In the ten months 83,090,710 gallons were imported, compared with 91,226,780 gallons in the same period of 1926.

Newcastle Gas Company and the Tynemouth Undertaking.—We are compelled to hold over this week the report of the proceedings (which is in type) in the Board of Trade inquiry as to the proposal of the Newcastle-upon-Tyne and Gateshead Gas Company to acquire the undertaking of the Tynemouth Gas Company.

NEW SHOWROOMS AT SUTTON.



EXTERIOR OF THE NEW SHOWROOMS OF THE SUTTON GAS COMPANY.
Work designed and executed throughout by the Nautilus Company.

The new showrooms of the Sutton (Surrey) Gas Company, at 19-21, High Street, were opened informally on Monday, Nov. 7, by Alderman E. J. Holland, D.L., J.P., the Chairman of Directors, in the presence of a small gathering of shareholders, officials, and others.

The new premises comprise the Company's old showrooms, together with the adjoining establishment. The whole was designed by the Nautilus Company, of Luton, who have carried out the work in an admirable manner. Gas appliances of all descriptions are shown in such a way as to make them most attractive to the consumer.

Gas fires with suitable settings, well displayed, occupy the front portion, while at the back are cookers and geysers. Behind the showroom there is an excellent demonstration room for cookery lectures. The showrooms are panelled in Austrian oak and have oak floors, and in the gas fire section there is a charming inglenook.

Alderman HOLLAND remarked that the Sutton Gas Company had been in existence for seventy years, and that from small beginnings they had now developed into a Company manufacturing well over 400 million c.ft. of gas a year, which was distributed through 85 miles of mains. The quality was excellent and uniform. They had made no haste with the alterations to their showrooms, as they had in mind that the job should be done thoroughly; and he thought those present would feel that it was a satisfactory accomplishment.

Referring again to the gas produced by the Sutton Gas Company, Alderman Holland said that the price compared most favourably with that of any other Company in London and in the neighbourhood. During the worst period of the coal stoppage, the price was never higher than 1c$\frac{3}{4}$d. per therm.

In the showrooms they now had an opportunity of displaying a much larger selection of gas apparatus under comfortable conditions. The rooms were open for inspection during the week, and after that for three weeks there would be a series of demonstrations on the best methods of using gas appliances. They were told sometimes that electricity was going to cut them out, but their record showed that they had made enormous strides. For a very long time they had not had a break in the output. That was a highly satisfactory record, and reflected great credit on all those concerned in the management —not only the Directors, but also the staff, Mr. Gage, Mr. Carpenter, and Mr. Davis.

COOKING AND WATER HEATING SECTION.
On the left-hand side can be seen a "Nautilus" boiler fitted in combination with a gas cooker in a recess.

View of the Gas Fire Section, showing Davis and other makers' designs, and part of the Cooker Section.

Part of the Gas Fire Section, showing the attractive inglenook and the cash counter.

Mr. G. H. DENNIS, J.P., Chairman of the Sutton Urban District Council, praised the new showrooms, and congratulated the Company on the improved lighting in the bottom part of the town. He hoped the Sutton Gas Company would be rewarded for the expense they had gone to in making provision for people not only to see exquisite designs, but also to learn the most economical way of using gas.

Councillor R. W. WOOTTEN, J.P., C.C., Dr. G. G. HOOPER, J.P., and others also congratulated the Gas Company on their latest improvement.

THE SLAG CORROSION PROBLEM.

Further Remarks by A. J. Dale, B.Sc., A.I.C.

Further to the important addition made by Mr. Diamond to the previous note by Mr. Corfield and himself, and to the preliminary statement by myself (see "JOURNAL," Vol. 178, pp. 1007, 1000, and 1004), may I append the following remarks:

(1) The interior retort temperatures of the end sections now recorded suggest generally a freedom from spalling due to the volume changes which characterize the inversions of the different crystalline varieties of silica. Nevertheless, an interior temperature of 790° C. at the end silica segments, considered along with the surface cooling effects of the fresh change, does not seem to guarantee absolute immunity from this possible cause of internal roughness.

(2) Regarding the joints. Mr. Diamond records a new fact which may have a direct bearing on the trouble under investigation. The fact that the jointing material has disappeared suggests a horizontal movement of the corner segment away from the adjacent bottom retort tile.

Such an occurrence would cause:

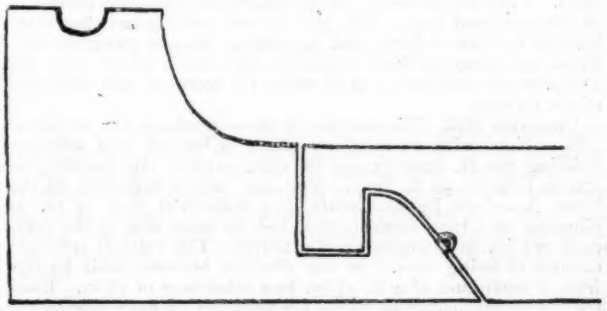
(*a*) An internal roughness.

(*b*) A local high interior temperature due to the circulation of the heating gases within the opened joint.

(*c*) A possible reducing atmosphere within the joint due to gas leak during carbonization, and an oxidizing atmosphere within the joint during the periods between discharge and charge.

In this case, the cause of the failure might rest primarily neither in the silica nor in the jointing material, but rather in some constructional defect which allows the side segment to pull away from the base tile. Temperature, ash, and atmosphere still remain important factors in the consideration.

If the opening of the joint is really the root cause of the trouble, one wonders whether a self-locking joint similar to that shown in the accompanying sketch would be sufficiently strong to resist expansion stresses.



Self-Locking Joint.

One of the most important elucidations of the present discussion is the almost complete immunity of silica to attack by ferruginous ash at high temperatures—*i.e.*, 1350° or above—*providing the surrounding atmosphere is of an oxidizing nature.*

It is not considered that the ash normally deposited in a silica horizontal retort is sufficient to cause excessive corrosion, but it was suggested tentatively that if conditions were such as to cause high local concentration of ferruginous ash, then an excessive corrosive reaction might proceed in a reducing atmosphere.

Conversely, in the absence of exceptional circumstances, well-fired silica should, and does, function well in carbonizing installations.

In conclusion, I would like to congratulate Mr. Diamond on his further valuable contribution to the present state of our knowledge on this problem.

THE PITTSBURG GASHOLDER DISASTER.

The first issue of our American contemporary the "Gas Age-Record" to be published after the occurrence contains an account of the terrible disaster to the 5 million c.ft. natural gas holder of the Equitable Gas Company in Reedsdale Street, North Side, Pittsburg. Particulars of the explosion, from cabled accounts which had appeared in the daily papers of this country, were given in the "JOURNAL" for Nov. 16; and these were supplemented in last week's issue by a series of photographs depicting the extent of the damage caused.

HEAVY LOSS OF LIFE AND PROPERTY.

The explosion occurred at 8.43 a.m. on the morning of Nov. 14; and the number of the "Gas Age-Record" before us is dated Nov. 19—at which date the disaster remained unexplained. Indeed, the suddenness and the extent of the catastrophe were such that it was impossible to get even two eye-witnesses to agree in describing it. The number of bodies taken from the ruins had reached 23; and it was believed that the complete list of fatalities would be not less than 50. Approximately 400 persons were injured; while estimates of the damage ranged from $2,000,000 to $5,000,000. A 6 million c.ft. tank adjoining, and a smaller one of ¾ million c.ft. also suffered severely. Serious as the disaster has proved, there is satisfaction to be derived from the fact that American Gas

Association records show this to have been only the third explosion in connection with gasholders to take place in the United States.

WORKERS WITH BLOW TORCHES PATCHING-UP DEFECTS.

What caused the explosion may, says the writer of the message, never be actually determined. This was indicated by workers in four separate investigations who found themselves compelled to depend almost entirely on the statements of those in the neighbourhood, but not actually within the zone of the explosion. So far as is known, every workman actually engaged in repairing the tank which exploded was killed. The three natural gas tanks stood alongside one another, as shown in the aerial view on p. 610 of last week's "JOURNAL."

On one of them, a dozen welders of the Riter-Conley Company were working with blow torches and scrapers to patch-up defects which had revealed themselves during the holder's idleness. Water and air were, it is said, the only materials in that tank. It has been suggested that a stray leakage of gas found its way from a neighbouring tank to the holder under repair, and came in contact with the flame of the torches; but experts admit their bewilderment. Another theory is that this holder, which had been empty for months, had a residue of gas in it. One of the torches may have exploded a pocket of gas, which spread to other parts of the tank.

For ten days water had been flowing into the bottom of the tank; and two days before the disaster, it had reached a level which would permit of air being pumped in for the raising of the first of the three lifts. The men were prepared to begin their work with the rise of the first lift; and the explosion took place approximately half-an-hour after their starting time. What happened in the interim no official could say; but the General Manager of the Riter-Conley Company could assign no reason, save an accumulation of gas, for the blast which wrecked the empty holder, and those near it, which were filled. The holders were built nearly a decade ago. Neither of the other two holders exploded, although holes were blown into them, and their contents of gas escaped and burned in the air.

SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).

The Scottish Western Juniors visited the Clydesdale Iron and Steel Works of Messrs. Stewarts & Lloyds, Ltd., at Mossend on Wednesday evening, Nov. 23, and were received on behalf of the management by Mr. Carmichael. Those present were then divided into groups, and were conducted over the works by members of the staff.

DESCRIPTION OF THE WORKS.

The works at Mossend are served by the London, Midland, and Scottish Railway Company. They have recently been remodelled and modernized, to enable them to manufacture roll-edge plates in an up-to-date universal mill. The works comprise melting shop, cogging mill, and universal plate mill, with the necessary gas producers, re-heating furnaces, shearing plant, and other auxiliaries.

Melting Shop.—This contains eleven 50-ton open-hearth furnaces, two of which are acid lined; the remainder being basic lined. They are served by three open-hearth charging machines of the overhead type. The gas for the melting and ingot re-heating furnaces is generated in thirteen Morgan gas machines. These are equipped with automatic regulators, which keep the gas pressure constant, and so make for economy and efficiency of the furnace.

Universal Mill.—The feature of these works is the universal mill, which, with its auxiliary plant, is housed in a spacious building 960 ft. long by 107 ft. span, with a side building of 570 ft. long by 50 ft. span. The mill, which embodies all the latest American improvements, has horizontal rolls 34 in. in diameter and four vertical rolls, two on each side of the mill, each 26⅜ in. in diameter on the barrel. The vertical rolls are capable of being spaced at any distance between their barrels from a maximum of 4 ft. 1⅜ in. to a minimum of 7¾ in. Electrically driven live roller racks are provided on each side of the mill.

Cooling Bed.—The delivery rack from the mill is continuous with the entering rack of a plate flattening machine, or mangle, which is of the nine-roller type, electrically operated. The delivery rack from the mangle in turn is in line and continuous with a rack which extends the full length of the cooling floor. On the other side of the floor there is a similar rack to receive the cooled plates. The plates are traversed across the cooling floor on heavy link chains running in grooves in cast-steel lifting beams, which, when not in use, lie below the level of the rollers and the stationary rest bars forming the floor. By raising the beams, the chains can be brought into contact with the plates, lifting them clear of the live rollers and rest bars. Then, by setting the chains in motion, the plates can be moved across without any risk of being scratched. To deal with plates which may not be quite straight on the edge, there are twenty-two straightening blocks provided, divided into two groups of eleven each. These blocks are moved by screws and press; the plates being operated on against fixed straight edges of length sufficient to deal with the longest.

Electrical Equipment.—As already stated, the mill is electrically operated. This is effected by means of a reversing motor supplied with D.C. current from a fly-wheel equalizer set. The current is taken from the Clyde Valley Electrical Power Company at 11,000 volts three-phase, with a frequency of 25 cycles per second, and led to the E.H.T. switchboard, on which are the necessary switches, voltmeters, ammeters, and power-factor meters.

The Universal mill was laid down to meet the requirements of the Company in strips for the manufacture of lapwelded tubes.

VOTE OF THANKS.

After the inspection the visitors were entertained at tea, following which, on the motion of Mr. R. FIFE, the firm were cordially thanked for the privilege extended to the Association.

Mr. CARMICHAEL replied to the vote of thanks.

COAL AND BYE-PRODUCT EXPORTS.

It will be seen that the prices obtained for coal sent abroad continue at a low point, as compared with 1925, although the collieries have been successful in selling more coal to consumers overseas. Business, however, is far from approaching the figures which obtained in the year preceding the war.

COAL EXPORTS.

The total quantity of coal shipped during October was 4,141,106 tons, which compares with 3812 tons in 1926, and 4,382,484 tons in 1925. The value in October was £3,473,186; in October, 1926, £2408; and in October, 1925, £4,017,907. Of the above quantities and values, gas coal was represented by 558,538 tons, as against 644,351 tons in October, 1925. The values were: October, 1927, £428,352; October, 1925, £524,821. The average value of gas coal per ton in October was 15s. 4d.

Taking the ten months of the year, the total quantity of coal sent abroad was 43,136,043 tons, as against 18,982,691 tons in 1926, and 41,847,299 tons in 1925. The values were: 1927, £38,991,297; 1926, £17,246,864; 1925, £42,215,131. In these quantities and values, gas coal figured for 5,543,395 tons this year, 2,491,787 tons in 1926, and 5,652,887 tons in 1925. The values were: 1927, £4,617,972; 1926, £2,032,988; 1925, £5,329,668.

GAS COKE.

In October, the amount of gas coke exported was 129,884 tons, against 14 tons in October, 1926, and 133,963 tons in October, 1925. The values were: October, 1927, £130,648; 1926, £51; 1925, £126,535. The average price per ton in October was £1 0s. 1·4d.

In the ten months ending October, 766,139 tons were shipped, as compared with 383,422 tons in 1926, and 570,105 tons in 1925. The values were: 1927, £803,244; 1926, £395,492; 1925, £646,535.

TAR PRODUCTS.

The quantity of benzole sent abroad in October amounted to 345,418 gallons, as compared with only 50 gallons in October, 1926. The total for the ten months was 1,235,130 gallons, as compared with 420,108 gallons in the corresponding period of 1926. The demand from abroad for naphtha is of such small dimensions that we will only refer to the total figures for the ten months. They were, this year, 40,602 gallons, and last year 60,936 gallons. Tar, oil, creosote, &c., was shipped in October to the amount of 1,503,699 gallons, as against 302,080 gallons in October, 1926. The aggregate for the ten months was 30,984,697 gallons, as against 34,224,830 gallons in 1926.

SULPHATE OF AMMONIA.

Relatively the sulphate of ammonia sales abroad are a great improvement on those for 1926. In October, 29,496 tons were sold overseas, as compared with 5585 tons in October, 1926. In the ten months to the end of October, 218,305 tons were sent abroad, as compared with 149,268 tons in the ten months of 1926. Spain and the Canaries continue to be our best buyers, with 81,794 tons in the ten months, as compared with 37,290 tons in the same period of 1926. Japan comes next, with 68,500 tons, as compared with 37,627 tons in 1926.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Discussion on Continuous and Intermittent Vertical Carbonizing Systems.

A Meeting of the Association was held on Friday, Nov. 25, under the presidency of Mr. LEONARD LACEY, B.Sc., when the following paper was presented.

CARBONIZATION IN VERTICAL RETORTS.

By T. CAMPBELL FINLAYSON, M.Sc., A.M.I.Chem.E., of the Research Section, The Woodall-Duckham Companies.

[EXTRACTED.]

On June 11 last, your Association paid a visit to the works of the Isle of Thanet Gas Light and Coke Company at Margate. Among the other interesting features of that visit you inspected the new installation of Woodall-Duckham continuous vertical retorts. Your Council thought that a paper on the general subject of carbonization in vertical retorts would be of interest; and I greatly appreciate the honour you have done me in allowing me to present this paper.

In the published description of your visit to Margate, it is made clear how much this London and Southern District Association owes to the pioneer work of Mr. J. M. Campbell, Engineer and General Manager at Margate. In the matter of carbonization, Mr. Campbell has also been a pioneer, the most recent proof of which you find in his decision to erect the first installation of continuous vertical retorts with the largest carbonizing capacity per retort yet erected in this country. It is a matter of interest to be able to report that similar sized retorts, with a total capacity of approximately 15 million c.ft. per day, are at present being built.

The success attained in the construction of continuous vertical retorts is attributable to the careful development of certain main features:

1. Coke extraction device and bottom ironwork.
2. Top ironwork design.
3. Correct taper of retort.
4. Method of heating.
5. Retort construction.

COKE EXTRACTION DEVICE.

The efficiency of the extractor is of the utmost importance, as the successful working of the retort is dependent upon it. [The " W-D " extractor has previously been described and illustrated in the " JOURNAL."]

Below the extractor is a cast-iron receiving hopper which is normally constructed to receive two hours' supply of coke. The bottom of the receiving hopper is closed by a water-sealed gas-tight door. This water-sealed door is one of the chief factors which accounts for the low percentage of inerts found in the vertical retort gas. Even with level gauge pressure at the top of the retort, conditions of pull exist at the bottom with normal coals, due to the stack effect of the retort. This necessitates a carefully constructed door through which to extract the coke; and fig. 1 shows a cross-section of the " W-D " water-sealed door. Though the door is sealed in 4 in. of water when closed, the water is never in contact with the coke.

TOP IRONWORK DESIGN.

Fig. 2 shows a cross-section of the latest type of top ironwork in connection with the " W-D " system. Satisfactory operation of the retort depends not only upon regular extraction of coke, but also upon regular feed of coal into the retort. A considerable amount of attention has been given to this subject

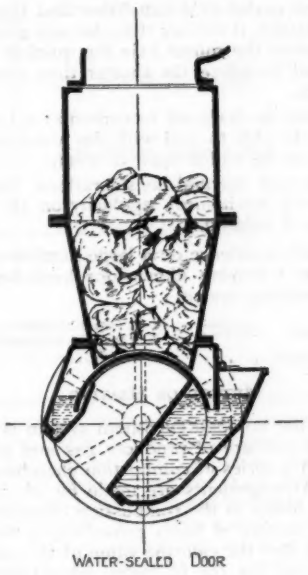


Fig. 1.

of top ironwork design. Comments on this investigation were made by Mr. T. F. E. Rhead, Chief Chemist of the Birmingham Gas Department, in his outstanding contribution on " Some of the Factors Affecting Carbonization in Continuous Vertical Retorts " [" JOURNAL " Institution No., Sept. 29, 1926]. As the result of this investigation, the design shown in fig. 2 has been adopted as standard. The objects kept in mind were:

1. To ensure distribution of coal along the whole major axis length of the retort.
2. To allow the gas to pass away with minimum contact with coal in the top ironwork.

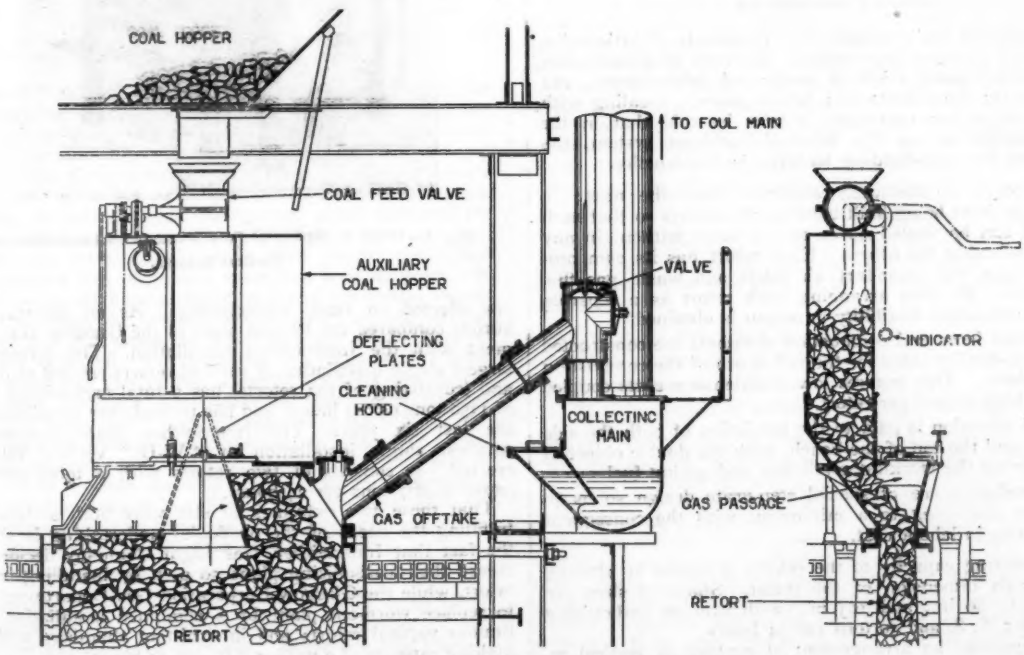


FIG. 2.—TOP IRONWORK—CROSS-SECTION.

CORRECT TAPER.

The minor axis of the continuous vertical retort is tapered for two reasons:

1. To compensate for the swelling of the coal.
2. To ensure easy travel of the charge as it passes down through the retort.

Some of the factors which govern the determination of correct taper may be summarized as follows:

1. Carbonization takes place much more rapidly at points near the retort wall than at points farther away from the source of heat. Therefore *under static conditions* the rate of heat penetration to the centre of the charge is more rapid in a narrow retort.
2. Keeping the major axis dimension and the height of the retort constant, it follows that, for any given throughput, the narrower the minor axis the quicker the coal must travel, and therefore the shorter time available for carbonization.
3. Retorts must be designed to carbonize a variety of coals, and must be able to deal with the worst coal which they are likely to be called upon to treat.
4. Apart from any thermal considerations, the retorts must operate with mechanical regularity on all coals with the minimum of rodding.

As the result of experience on a large number of installations and designs, the following dimensions have been adopted in the Woodall-Duckham system:

Minor axis	Top dimension, 10 in. Bottom dimension, 18 in.
Retort length	25 ft.

METHOD OF HEATING.

The retort in the Woodall-Duckham system is heated by the combustion of a mixture of producer gas and air in a downward direction in a series of combustion chambers on each side of the retort. Arrangements are made for air to be admitted at two different levels in the combustion chamber. This gives flexibility in the zoning of heats according to the class of coal being carbonized and the calorific value of the gas to be made. Downward heating has the following advantages:

1. It is possible, when desired, to carry maximum temperatures at the top of the retort, with moderate temperatures at the bottom. This is particularly important, for example, when making high calorific value gas from a hard non-swelling coal, which would tend to give excessive tar production and low calorific value gas.
2. It is possible by the use of the additional secondary air to ensure maximum temperatures in the middle of the retort, and good bottom temperatures suitable for high output of gas under steaming conditions.

With modern silica settings, the average temperatures in the combustion chambers may be taken as 1375° to 1425° C. at a point 6 ft. from the top, and 1050° to 1200° C. in the collecting flues at the bottom of the combustion chambers.

RETORT CONSTRUCTION.

A knowledge of the principles of a process is of little value if construction practice lags behind. Methods of construction have demanded many years of study and development, and could well form the subject of a whole paper. Dealing with the matter in a few sentences, it may be said that in the modern installations on the Woodall-Duckham system, the following are four outstanding features in construction:

1. Each retort is absolutely separate from the next; a straight joint being built between the retorts so that each retort can be heated up or cooled down without in any way affecting the others. Each retort has its own producer gas and secondary air inlets and waste gas flue damper. By thus arranging each retort as a separate unit, maximum flexibility in output is obtained.
2. The retort faces and combustion chambers are constructed of high-quality silica for the full depth of the combustion chambers. This ensures low maintenance costs coupled with high output per retort.
3. Special attention is paid to the insulation of both the side walls and the top of the bench, with the double object of improving the working conditions and saving fuel.
4. The producers are of special step-grate design so as to reduce clinkering to a minimum, with the consequent reduction in labour cost.

The carbonizing capacity of the retorts is varied by altering the major axis dimension of the retort. Standard sizes are 53 in., 62 in., 80 in., and 103 in., with average carbonizing capacities of 5, 6, 8, and 10 tons per 24 hours.

Fig. 3 illustrates an arrangement of continuous vertical retorts, of which a large number of plants have been erected—namely, settings consisting of four retorts, one producer, and one recuperator.

Fig. 4 illustrates the most recent lay-out of plant as erected at the Bow Common Station of the Gas Light and Coke Company (see Hardie, "Some Phases of Modern Practice in Gas Manufacture," "Fuel Economist," December, 1926). This arrangement gives high output per sq. ft. of ground space. In contradistinction to the settings of four, it will be seen that the retorts are heated by producer gas made in a battery of step-grate producers from which the producer gas travels to the retort combustion chamber through insulated steel mains. The waste gases passing away from the bottom of the combustion chambers are collected in an outside insulated steel main and led to the waste-heat boiler.

It will interest you to know that the installation of continuous vertical retorts which is now being erected at the Fulham Works of the Gas Light and Coke Company will consist of 72 retorts of the size you inspected at Margate (103 in. major axis), but arranged in two benches on the general lines of the Bow Common plant, as shown in the diagram. This Fulham installation will be capable of making approximately 10 million c.ft. of gas per day under ordinary working conditions when carbonizing unscreened Durham coals.

There is still a certain amount of belief that continuous vertical retorts are only suitable for big works. This is a false impression, as some of the best results and greatest savings

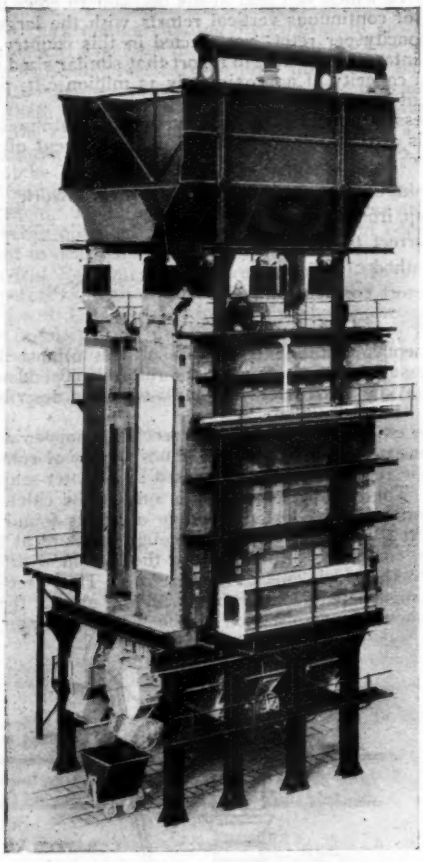


Fig. 3.—Model of Setting of Four Woodall-Duckham Continuous Vertical Retorts.

are effected on small undertakings. As an illustration, the author compared the Provan plant of the Glasgow Gas Department with the Innerleithen installation. The former is the largest single installation of vertical retorts erected at one time, and (consisting of 192 retorts) has a total carbonizing capacity of 1356 tons per 24 hours, and has treated over 1¼ million tons in the last six years. The Innerleithen plant represents the smallest single installation of "W-D" vertical retorts yet erected. It consists of two retorts with a total carbonizing capacity of 7 tons per 24 hours.

That these two extremes in size were both satisfactory in fulfilling the needs of the particular undertaking is shown by the fact that Innerleithen Gas Light Company decided to increase their carbonizing plant 50 p.ct. by installing one more retort, while the Glasgow Corporation Gas Department decided to replace worn-out plant by a combined installation of continuous vertical retorts and intermittent chambers with a gas-making capacity of 9 million c.ft. per 24 hours.

The advantages which can be claimed for the process of

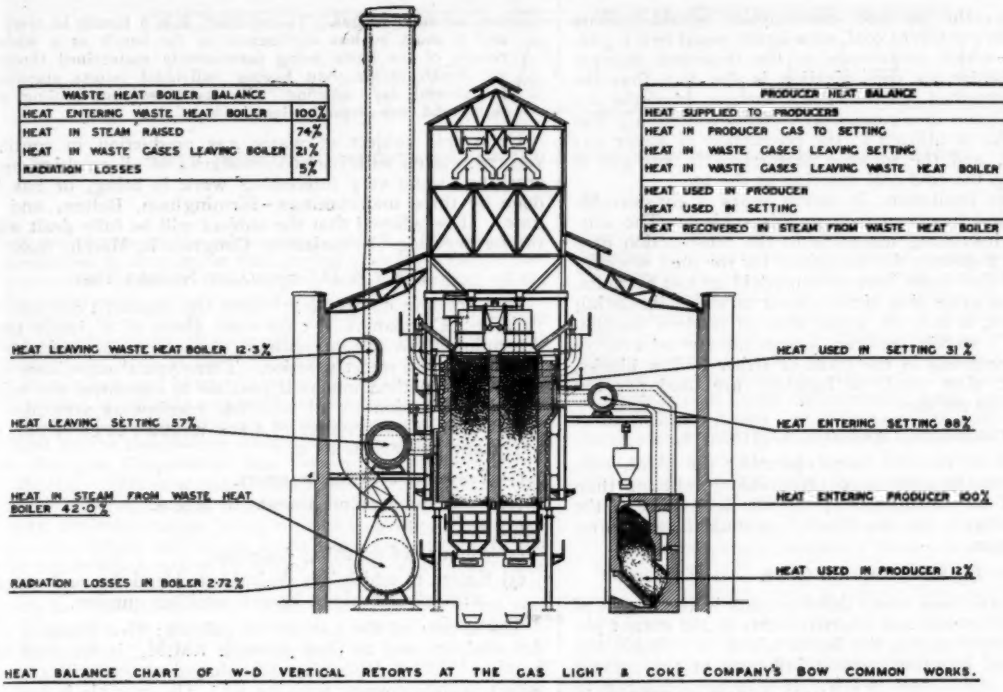

WASTE HEAT BOILER BALANCE
HEAT ENTERING WASTE HEAT BOILER 100%
HEAT IN STEAM RAISED 74%
HEAT IN WASTE GASES LEAVING BOILER 21%
RADIATION LOSSES 5%
PRODUCER HEAT BALANCE
HEAT SUPPLIED TO PRODUCERS 100% 3,668,000
HEAT IN PRODUCER GAS TO SETTING 88% 3,227,840
HEAT IN WASTE GASES LEAVING SETTING 57% 2,090,000
HEAT IN WASTE GASES LEAVING WASTE HEAT BOILER 12·3% 450,000
HEAT USED IN PRODUCER 12% 440,160
HEAT USED IN SETTING 31% 1,137,840
HEAT RECOVERED IN STEAM FROM WASTE HEAT BOILER 42·0% 1,540,000
HEAT LEAVING WASTE HEAT BOILER 12·3%
HEAT LEAVING SETTING 57%
HEAT IN STEAM FROM WASTE HEAT BOILER 42·0%
RADIATION LOSSES IN BOILER 2·72%
HEAT USED IN SETTING 31%
HEAT ENTERING SETTING 88%
HEAT ENTERING PRODUCER 100%
HEAT USED IN PRODUCER 12%
HEAT BALANCE CHART OF W-D VERTICAL RETORTS AT THE GAS LIGHT & COKE COMPANY'S BOW COMMON WORKS.

FIG. 4.—CROSS-SECTION OF BOW COMMON INSTALLATION.

carbonization in continuous vertical retorts may be summarized as follows:

(1) LARGE OUTPUT OF GAS PER SQUARE FOOT OF GROUND SPACE.

In these days of increasing demand for gas, the problem of producing the maximum output of gas from a given ground space is becoming a matter of increasingly great importance to gas engineers. Of all the forms of carbonizing plant, continuous vertical retorts give the largest output of gas per square foot of ground space occupied; and in this direction striking developments have been made within the past few years. In the following table you will see that in a typical

Ground Space Occupied by Four Typical Installations of "W-D" Continuous Vertical Plants.

Installation.	Year.	Capacity, Tons per 24 Hours.	Ground Space Occupied, Sq. Ft.	Sq. Ft. Ground Space per Ton Carbonized per 24 Hours.	C.Ft. Gas* (500 B.Th.U.) per Sq. Ft. Ground Space per 24 Hours.
A . . .	1914	120	4,970	41·4	377
B . . .	1919	200	8,236	41·2	378
C . . .	1925	512	13,420	26·2	595
D . . .	1927	695	14,232	20·5	761

* Based on an average yield of 15,600 c.ft. per ton.

installation of "W-D" continuous vertical retorts in 1914, the amount of ground space occupied per ton of coal carbonized per 24 hours was 41·4 sq. ft.; this giving, under average conditions of gas production, with a yield of 15,600 c.ft. of 500 B.Th.U. gas per ton, an output of 377 c.ft. of gas per square foot of ground space per 24 hours. In an installation being built during the present year, the ground space occupied per ton of coal carbonized per 24 hours is slightly less than half that of the 1914 installation; or, in other words, the output of gas per square foot of ground space has been doubled. In comparison with old hand-charged stop-end horizontal retorts of twenty years ago, the modern vertical retort installation can produce nearly eight times as much gas per square foot of ground space occupied. For purposes of comparison, I may, perhaps, remind you that in Mr. Thomas Hardie's presidential address to the Southern Association of Gas Engineers and Managers this year—see "GAS JOURNAL" for April 6, p. 34—he stated that the modern machine-charged horizontal retorts will produce approximately 267 c.ft. of gas per square foot of ground space in a house specially designed for such purposes. The modern vertical retort installation can, therefore, still produce approximately three times as much gas per square foot of ground space as can the modern horizontal retort.

(2) MAXIMUM YIELD OF GAS PER TON OF COAL.

At the present time gas is sold on the calorific value basis. This has increased the tendency to supply a mixture of coal gas and water gas for town purposes. There are two ways of making such a mixture—either by the production of water gas from coke in separate water gas generators, and mixing it with straight coal gas, or, alternatively, by producing mixed gas in a one-stage process. It is for this latter process that the continuous vertical retort is peculiarly suitable. By the introduction of steam at the base of the retort, a twofold object is served. First, the red-hot coke passing down to the bottom of the retort is cooled, and this can be extracted in a dry, cool form; and, secondly, the steam usefully employs the sensible heat of the coke in the production of water gas. This water gas passing up the retort mixes with the coal gas which is being evolved from the coal in the upper parts of the retort, and a regular output of mixed gas per retort is thus obtained. By this method, high thermal yields can be obtained per ton of coal in a single process. The proportion of water gas may be increased or decreased by varying the percentage of steam passing into the retort.

(3) FLEXIBILITY.

Closely related to this factor of yield of gas per ton of coal is the factor of the flexibility of continuous vertical retorts. In installing a new plant which is to make gas for many years to come, it is of advantage to an engineer to be able to vary his calorific value, his output, and his coals, without disorganization. Particularly with a small undertaking, this factor of flexibility of the modern continuous vertical retort is one of very great importance. Without any disorganization in his plant, an engineer may alter the calorific value of the gas produced by his installation of continuous vertical retorts from (say) 530 to 420 B.Th.U. by altering the percentage of steaming.

In comparison with other forms of carbonizing plant, the continuous vertical retort is sensitive to demands of output. Over reasonable limits, throughput may be speeded-up, with consequent increase in output of gas; and conversely, by the simple operation of reducing the extractor speed, the output of a plant may be slowed up within a few hours.

(4) HEAT CONSERVATION.

The modern continuous vertical retort installation is a highly efficient process from the thermal point of view. The factors which have led to this state of affairs may be summarized as follows:

1. Design of step-grate producers.
2. Silica construction of the retorts.
3. Installation of waste-heat boilers.
4. Heat insulation of settings, flues, and boilers.

In the modern type of continuous vertical retort setting, as much as 1500 lbs. of steam per ton of coal carbonized can be obtained. In assessing the thermal value of a process of carbonization, it is suggested that the figure that matters to the gas engineer is not the gross amount of fuel supplied to the producer, but the net amount—that is, the heat supplied to the producer, *less* the heat value of the steam recovered from the waste gases. Assuming that under the best conditions of operation 8 lbs. of steam can be produced per pound of coke in a direct coke-fired boiler, the 1500 lbs. of recovered steam is equivalent to at least 188 lbs. of dry coke. If the gross figure of coke charged to the producers per ton of coal carbonized be

taken as 336 lbs., the net fuel consumption would become 148 lbs. of dry coke per ton of coal, or a figure equal to 6·6 p.ct.

Another factor which contributes to the improved thermal efficiency with continuous carbonization is the fact that the coke from the bottom of the retort and the gas from the top of the retort both leave in a comparatively cool condition. The heat from the coke is utilized in the production of water gas within the retort, and the sensible heat from the hot gas is used in heating up the cold coal entering at the top.

As regards heat insulation, in recent years a considerable amount of attention has been paid to this subject. The suitable use of heat insulating materials in the construction of a carbonizing plant improves the conditions for the men working on the plant, and also saves heat which would be lost by radiation. To give you some idea of the extent to which insulating materials are used, it may be stated that on modern installations of "W-D" vertical retorts, approximately 20 c.ft. of heat insulating materials in the form of either hollow blocks, insulating bricks, slag wool, or lagging, are used per ton carbonizing capacity per day.

(5) Satisfactory Operating Conditions.

From the point of view of those operating the plant, continuous vertical retorts give more favourable conditions than any other form of carbonizing plant. By the acceptance of the principle, "Let Gravity do the Work," manual labour is reduced to a minimum.

(6) Low Capital Cost.

Though there have been many developments in the design of continuous vertical retorts and improvements in the output per square foot of ground space, the factor which is probably the most striking, and has the greatest influence at the present time, is that the capital cost is low. It may be of interest to state that, dealing with the system concerning which I am able to give you information, the price of one large 1927 installation including the modern improvements of silica construction, heat insulation, and waste-heat boilers, is approximately £230 per ton of coal carbonized per 24 hours. This figure is no higher than the cost of the old fireclay type of settings erected twelve years ago without waste-heat boilers. Taking into consideration also the fact that the output on the 1927 plant per square foot of ground space is double that of the pre-war plant, it becomes clear how striking the developments have been in recent years.

(7) Coke Quality.

The coke produced from continuous vertical retorts is found to be particularly suitable for domestic use. This is probably accountable for by its ease of ignition and dryness. Suitably graded dry vertical coke burns satisfactorily in grates of the semi-well type.

Scurfing Retorts by Means of Water Gas Production.

In a paper which I had the privilege of giving last February to the Scottish Junior Gas Association ["JOURNAL" for Feb. 16, p. 392], information was included as to a patented process for the production of blue water gas in continuous verticals by charging them with graded coke. It was stated that "one important result of operating the retorts for a period on water gas production is that the scurf in the retort is removed by the interaction between steam and the scurf. In a number of cases, by arranging a suitable cycle, loss of time due to scurfing can be entirely eliminated. The determining factors are the type of coal to be carbonized and the calorific value of the gas to be made."

You may already know that Mr. Campbell is using this process on his large continuous vertical retorts at Margate. In brief, the process consists of charging the retort with graded coke in place of coal, and extracting unconsumed coke at the bottom to the extent of approximately 2 lbs. per 1 in. retort major axis per hour. Saturated steam is introduced through the normal steaming jets in the curved plate of the extractor box to the extent of 3 lbs. per 1 in. retort major axis per hour. The retort is operated under normal heating conditions and at level gauge at the gas offtake. Under these conditions a production of good quality blue water gas is made to the extent of about 75 c.ft. per 1 in. retort major axis per hour. The composition of the water gas remains very constant, containing on an average 4 p.ct. of CO_2 and 44 p.ct. of CO with a calorific value of 290 to 300 B.Th.U.

When a retort is ready for scurfing, instead of emptying out the coal and allowing the scurf to be burned off by means of air, during which time the retort is idle, by use of the water gas process, coke is allowed to follow the last charge of coal into the retort, and the scurf is gradually eliminated by interaction with steam.

To summarize the advantages of this application of the process, I cannot do better than quote Mr. Campbell's own words:

> I do not think there can be any doubt as to the advantage to be secured by the adoption in general practice of making water gas in the retorts, as and when they become necessary to be scurfed. By so doing the productivity of the plant is maintained, and no chilling effect is caused to the surface of the retort when scurfing, and the change from coal to coke, and, later, from coke to coal, can be effected without any loss of time or make of gas. To my mind, it is a benefit in every way, and it must be less detrimental to the bench as a whole, by reason of the heats being permanently maintained throughout the bench rather than having individual retorts standing off for several days scurfing, with its consequent cooling of the retort and loss of production.

Upon this subject of water gas production in continuous vertical retorts, with its two corollaries of oil cracking and tar cracking, some very interesting work is being, or has been, done by three undertakings—Birmingham, Bolton, and Margate. It is believed that the subject will be fully dealt with in the forthcoming Carbonization Congress in March, 1928.

The "W-D" Swelling Number Test.

In a previous contribution* from the Research Section of the "W-D" Companies, details were given of a simple test for determining the swelling powers of coals, with particular relation to vertical retort practice. Three years' experience in the use of this method makes it possible to commend the value of the determination to all who use continuous verticals. The test, which takes a matter of a few minutes to carry out, gives important indications as to:

(1) Travel of coal in the retort.
(2) Coke quality and amount of breeze.
(3) Tar yield.
(4) Amount of crushing desirable.
(5) Extent to which it is desirable to blend the coal under test with other coals of known swelling number.

The details of the test are as follows: One gramme of the dry coal, ground to pass 30-mesh I.M.M., is weighed into a number "CO" Vitreosil squat-shaped opaque silica crucible, which is then covered with its lid. The crucible is heated for 15 minutes over a full bunsen flame, and is allowed to cool. The size of the burner does not seem to affect the results to any marked degree, and one with a tube 9 mm. in bore answers very well. As regards the relative positions of the flame and the crucible, the latter should be so situated that the top of the blue cone of the flame just fails to touch the bottom of the crucible.

The results obtained are very concordant, and the apparatus is simple. Fig. 5 shows the appearance of the coke masses obtained when 1-gramme samples of different types of coal are tested in the manner described. It will be seen that at least nine gradations are possible. By interpolation, further gradations may be made use of so that a coal might be described as occupying position 4½ in the swelling series.

Systematic testing by this method of a number of coals in use on a vertical retort installation, collated with the experience found on the performance of such coals, will be found invaluable in anticipating the conditions suitable and the performance of new coals which the plant may be called upon to treat.

This may perhaps be illustrated as follows: Suppose an installation of continuous vertical retorts is working screened coal with an average swelling No. 2½, what are the likely effects if (*a*) a coal of swelling No. 1, and (*b*) a coal of swelling No. 4, is substituted?

With the coal of swelling No. 1, one would expect to find:

1. A minimum of trouble in connection with travel of coal into and through the retort.
2. A larger proportion of breeze in the coke.
3. A tendency for lower calorific value gas, due to increase in production of carbon monoxide.
4. A tendency for higher tar production per ton of coal.
5. Unless the rate of extraction be reduced, there will be an increase in the throughput due to the small size and greater density of the coke.

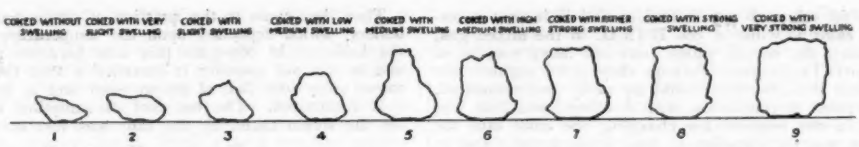
With coal of swelling No. 4, one would expect to find opposite tendencies—namely, larger coke, higher calorific value gas, less tar, less breeze, and less throughput (unless extraction rate be increased).

Intermittent Vertical Chambers.

The subject of this paper is Carbonization in Vertical Retorts. I should not be putting before you a complete picture of the subject if no attention were paid to vertical retorts on the intermittent as well as the continuous principle. Carbonization in intermittent vertical chambers has for many years been a system very popular on the Continent, though it has not yet been widely adopted in this country. However, "W-D" intermittent vertical chambers have been installed for the Borough of Ramsgate Gas Department, and are at present being built at Glasgow and Taunton.

In comparison with other forms of static carbonization, intermittent vertical chambers have the advantage that an increased output can be obtained per square foot of ground space. In addition, a larger gas yield per ton of coal carbonized can be guaranteed than from either horizontal retorts, inclined retorts, or coke ovens, due to the steaming of the charge during

* "A Study of the Principles and Practice of Coke Manufacture." Coke Competition Number, "GAS JOURNAL," November, 1925.



COKES FROM EQUAL WEIGHTS OF VARIOUS COALS SHOWING SWELLING GRADATION.

FIG. 5.

the last few hours of the carbonizing period. The chambers are economical to operate, in that having once elevated the coal to the overhead bunkers, the charging and discharging of the chambers both take advantage of the laws of gravity.

The author then briefly described the "W-D" intermittent vertical chamber plant, as exemplified at Ramsgate, of which an account was given in the "JOURNAL," Vol. 176, p. 360.

The continuous and static forms of carbonization in vertical retorts are not necessarily competitive. The attitude of the Company which I have the privilege to serve may perhaps be best illustrated by the installation which is at present being erected for the Glasgow Corporation Gas Department at their Dawsholm Works. This new plant comprises two benches of continuous vertical retorts and two benches of intermittent vertical chambers, the combination being such as to give, with the particular coals which are to be carbonized and the particular calorific value which has to be made, the best all-round results. In brief, the position is that in general Scotch coals are of relatively low caking quality. This, while making them particularly suitable for giving maximum throughputs and relatively high thermal yields when treated in continuous vertical

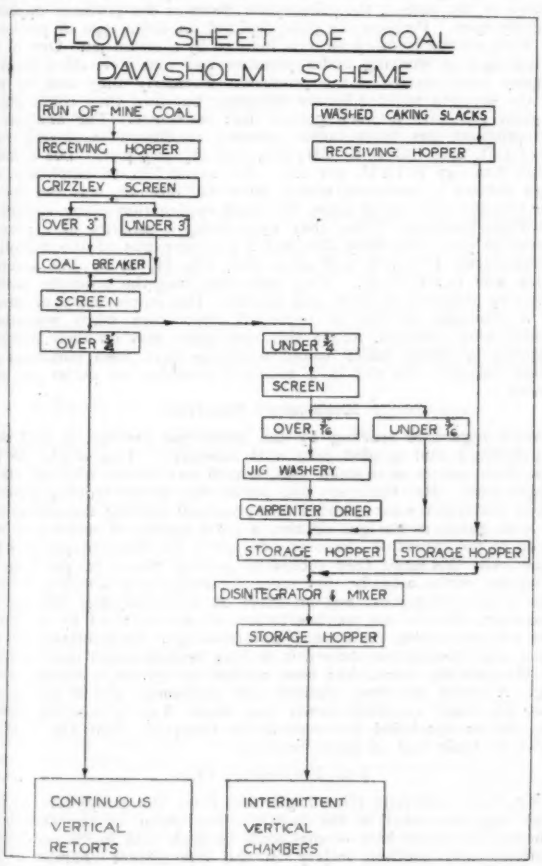


Fig. 6.

retorts, yet has the disadvantage that the small material tends to remain in the form of breeze after carbonization. A scheme consisting of two types of carbonizing plant has been evolved to give satisfactory gas output and yield per ton with improved coke quality. Fig. 6 illustrates diagrammatically the flow of coal at the Dawsholm installation. It will be seen that run-of-mine coal is tipped from wagons into receiving hoppers. The coal is then fed through a grizzly screen into a coal breaker. From there, the broken coal passes over a Hummer screen, and the material below ¾ in. is screened out. The coal above ¾ in. passes direct to continuous vertical retorts, which are operated under steaming conditions. The coal under ¾ in. passes to another Hummer screen, which removes all coal below 1/16 in. The fraction between 1 in. and 1/16 in. is washed in a jig washer, and dried in a continuous centrifuge of the "W-D" type. The washed and dried material is then mixed with the fine coal below 1/16 in. and conveyed to storage bunkers. Washed caking slacks are delivered to the works and conveyed to storage bunkers. The washed run-of-mine slacks and washed caking smalls are discharged from their respective storage hoppers with controlled rate of discharge on to a band conveyor, and travel to a disintegrator and mixer which intimately blends the two coals. The blend is then elevated to storage hoppers above the intermittent vertical chambers, which are operated to make high calorific value gas and high-quality coke from the blend. It is arranged that all the coke from the intermittent vertical chambers is delivered to a screening plant and made available for sale. The coke for heating both the sections is obtained from the continuous vertical retorts. The carbonizing plant consists of:

(*a*) 44 "W-D" continuous vertical retorts arranged in two benches, each containing twenty-two 103 in. retorts.

(*b*) 48 "W-D" intermittent vertical chambers arranged in two benches, each of twenty-four chambers.

The plant has a daily output of approximately 9 million c.ft.

This arrangement of carbonizing plant will give the Glasgow Corporation Gas Department flexibility as regards output, selection of coals, and calorific value. By the installation of coal cleaning and blending plant they will be able to ensure the supply of high quality coke.

This is an age of progress and development in the gas industry. The consumption of gas is increasing; and the interests of the consumer are being watched by improved service and by lower cost of gas. If there be any truth in the old adage "that profits are made in the retort house," then there must be progress and development in carbonizing methods. This paper will have achieved its object if it has put before you a picture of the part vertical retorts—continuous and intermittent—are playing in the gas-works of to-day.

In conclusion, I wish to express my thanks to our Chairman, Sir Arthur Duckham, K.C.B., for permission to present this paper, and also my indebtedness to Dr. E. W. Smith, Technical Director of the Woodall-Duckham Companies, for his guidance in its preparation.

Discussion.

The PRESIDENT remarked that they had listened to an address which would be particularly useful to them as a Junior Association. He well remembered that, when a boy, he was taken to the Nine Elms Works of the Gas Light and Coke Company, where his father was then engaged, to see the early efforts of the Woodall-Duckham Company in continuous vertical carbonization. On that occasion he had received the impression that vertical retorts were destined to play a big part in future gas-works practice, but he little realized that in a matter of twenty years, 50 p.ct. of the coal carbonized in gas-works would be treated in vertical retorts. One of the aspects of vertical carbonization which had been touched on by Mr. Finlayson was that the system was equally applicable to small and large works; and he admired the courage of Mr. Campbell, of Margate, in having the whole of his carbonizing plant concentrated in eight retorts. The fact that a plant of the size of that at the Provan Works, Glasgow, had been erected was a great tribute to the reliability of the system.

LABOUR COSTS.

Of course, development in horizontal carbonization had been very marked during the period which had been dealt with by Mr. Finlayson. The first great advantage of vertical retorts was the reduced labour costs; but such improvements had been effected in horizontals, by way of mechanical stoking arrangements, &c., that the difference between the horizontal and the vertical systems, as regards labour costs, was now not so marked. Another great advantage of verticals was the large amount of coal carbonized per unit area. Working conditions to-day in a vertical retort house were certainly better than those existing with the methods in the past; but, said Mr. Lacey, there was still room for improvement. The atmosphere on the top of vertical settings was not very cool, and sometimes there was a large amount of dust.

SCURFING BY THE WATER GAS PROCESS.

He had been particularly interested in one point mentioned by the author—the method of scurfing the retort by steaming, thus making blue water gas. They had seen this method in operation at Margate. The ordinary system of scurfing was lengthy, particularly where silica retorts were employed, for great care had to be exercised to avoid damage to the silica, and careful attention had to be paid to the temperature conditions of the retort. But, with the vertical system, a large amount of the available plant was out of operation during the scurfing period; and in this respect horizontals showed up to advantage. They had an example of what he meant at Margate, where, as he had mentioned, there were eight retorts. During the scurfing a gas of 300 B.Th.U. per c.ft. was made, while the older retorts were making a gas of 500 B.Th.U. The mixture

would have a calorific value of 475 B.Th.U.; and if it was necessary to maintain a calorific value of 500 B.Th.U. in the mixed gas, then they had to work the retorts which were not being scurfed so as to produce a 530 B.Th.U. gas. Perhaps they could regulate the extractor gear so that this alteration could be easily accommodated. There was another point in connection with scurfing; and that was to make provision in the hoppers for charging the coke into the retorts. Then there was the question of heat conservation; and in this respect vertical retorts showed up well. He took it that the 1500 lbs. of steam mentioned by the author was a gross figure. If 10 p.ct. was deducted for the steam required to drive the fan for the waste-heat boilers, then the fuel consumption would have to be increased from 6·6 p.ct. to 7·5 p.ct. Even so, it was only half the figure—15 p.ct. fuel consumption—which not many people could maintain constantly.

INTERMITTENT COKE.

With regard to intermittent vertical chamber carbonization, this was comparatively new in this country; and he was most interested in the Ramsgate installation and the Dawsholm scheme. It was really a case of a combination of coke oven and gas-works practice, which would enable coals to be blended. Washed caking smalls, Mr. Finlayson had mentioned, were mixed with run-of-mine slacks before storage. Would not this be dusty? He would like to know what method was used, and if any difficulties were experienced. Then they came to the question of coke quality. One of the advantages claimed for vertical retorts was that the coke produced required no quenching; but he thought it would be conceded that vertical retort coke was smaller and more friable than that from horizontals. In the past the practice was to aim at large coke; but this was no longer an advantage; for now the best outlet for coke was for the domestic hot water boiler, for which purpose it was necessary to break and screen the coke.

USE OF AUXILIARY SECONDARY AIR.

Mr. T. H. PRATER (Margate) observed that mention had been made in the paper of the use of auxiliary secondary air. Was this a new principle? They had tried auxiliary secondary air at Margate, and their experience with it had not been favourable. There was a tendency to local heating at the point where the secondary air entered the combustion chamber. If with ordinary heating the temperature at the top was 1450° C. and that at the bottom 1100° C., then, when auxiliary air was used, these temperatures were altered to 1200° and 1300° C. respectively. This high bottom temperature tended to fuse the dust, and trouble arose with the dampers. It had been suggested that the size of the retorts at Margate was large, but he saw no reason why they should not increase this. The chief difficulty with vertical retorts was caused by hanging-up of the charge; and the larger the retort, the less the trouble in proportion to the total column of the charge. The question of the position of the offtakes was interesting. Mr. Finlayson had thrown on the screen a slide showing the offtake at the side of the top casting, though it seemed to him (the speaker) that there were advantages in having the offtake in the middle of the top casting, as was the case at Margate. With regard to varying the throughput, this had been varied at Margate from 4 to 12 tons per day without causing any trouble. The Margate setting had no recuperators, while the settings shown in the author's slides were fitted with recuperators. Was there any distinct advantage gained by having these? The secondary air at Margate reached the combustion chamber at a temperature of 450° C., because the secondary air duct passed between the ends of two adjacent retorts.

CARBONIZING DURHAM COAL.

Mention had been made of the use of Durham coal in verticals. He thought it would be no breach of confidence to say that the recent order for the vertical installation at Fulham had depended largely on the tests which were carried out at Margate last Easter. There they carbonized successfully 10¼ tons of dusty Durham coal per retort per day, which was ¼ ton more than the normal throughput. The only difference was a higher offtake temperature; and they could steam successfully to obtain a 490 B.Th.U. gas. This was a useful figure, for it was mentioned at times that it was difficult to steam Durham coal, and that it was not much use unless a gas of 500 B.Th.U. or higher was being made. He had noticed, however, that the analysis of the gas showed a hydrogen content of as much as 56 p.ct. when Durham coal was being carbonized. The usual figure was 48 p.ct., though with washed Yorkshire coal they got 52 and 54 p.ct. Attention had been drawn to the output of verticals in relation to ground space occupied. The figure given in the paper—761 c.ft. of 500 B.Th.U. gas per square foot of ground space per 24 hours—was no exaggeration. This figure was equivalent to 826 c.ft. of 460 B.Th.U. gas; and at Margate they obtained 816 c.ft. per sq. ft.

DILUTING COAL GAS.

Mr. Prater went on to say that he questioned a little the policy of generating water gas in separate plants, and mixing this gas with the coal gas made in a separate carbonizing plant, to bring down the calorific value to the declared standard. Experience at Margate had shown that it might be a good plan to make the water gas in one of the retorts in the vertical setting, and use it for diluting the steamed coal gas. It had been found that scurfing a retort by steaming coke greatly reduced the throughput of the plant, and thus the gas production. If normally a gas of 460 B.Th.U. was made when working the eight retorts, and then two of the retorts were put off for scurfing by the water gas method, then it became necessary to produce a gas of 480 B.Th.U. in the other retorts. The difficulty could be overcome by using Durham coal and working one or two of the retorts on scurfing. With regard to the thermal yield from verticals, he was glad to notice that in the paper no claims had been advanced that they were capable of making so many therms per ton of coal. This claim had been overdone lately, for it was not the therms per ton, but the cost of the therm, which concerned gas engineers most. A carbonizing unit producing (say) 70 therms per ton might be better than one giving 78 or 80 therms per ton.

Then they came to the question of steam production in waste-heat boilers, which depended upon the temperature of the gas entering the boilers. At Margate this was between 1000° and 1050° C.; and he did not consider it remarkable that they had repeatedly obtained over 2000 lbs. of steam from and at 212° Fahr. per ton of coal carbonized. The net fuel consumption at Margate, allowing for the steam taken by the fan, was just over 6 p.ct.

TAR FROM VERTICAL RETORTS.

In considering vertical retorts, there always arose the question of tar, which caused trouble on account of its high phenol content and also because it was almost impossible to produce from it road tar to the Road Board's No. 1 Specification. The temperature of the gas coming away from the retorts at Margate was 135° Fahr., which, as they would realize, was very low. As a matter of fact, on one day last week the temperature was only 120° Fahr., when they were carbonizing 10 tons of Yorkshire washed nuts per day. He attributed this low temperature to the central offtake. The gas had to pass through a layer of comparatively cold coal, and the heavier constituents of the tar were condensed out. The tar which came away from the retort was consequently of a light nature. Now when this tar was treated to give it a viscosity of 18 seconds, there was such a proportion of light oils in the tar that on distillation they carried much of the phenol with them, with the result that the phenols remaining in the tar amounted to only 5 p.ct. He would be glad to know if Mr. Finlayson had any theory on the low temperature of the gas leaving the setting. This low temperature certainly assisted in condensation. Indeed, at Margate, one battery of condensers which it was thought would be necessary to cope with the output of gas had now been by-passed.

WORKING PRODUCERS UNDER PRESSURE.

Then, said Mr. Prater, he came to the question of cleaning the furnaces. The author had suggested they should be cleaned every eight hours, but actually at Margate they were cleaning half a furnace every eight hours. He (the speaker) thought it was a distinct advantage to work the producer under pressure. On the slide shown by the author, the primary air doors of the producer appeared slightly open. Perhaps the slide depicted an older type of producer. At Margate the primary air was induced by a steam jet. One of the advantages of working under pressure was that it enabled them to employ coke breeze in the producer. Formerly they had to rely on the draught induced by the chimney, but now they could obtain a good gas with a much greater fuel resistance. The analysis of the producer gas made under ordinary conditions employing coke was: CO_2 4·6, CO 28·6, CH_4 2·0, and H_2 10·5 p.ct. The calorific value was 147 B.Th.U. per c.ft. He would like to emphasize the high content of methane, which, he would observe, was not due to the volatiles left in the coke, by which explanation many sought to solve the problem. When they were using a mixture of 1 part of breeze to 3 of coke they obtained a producer gas of the following composition: CO_2 4·8, CO 28·4, CH_4 0·8, H_2 12·0. The calorific value was 140 B.Th.U. They had also fired the producer with a fifty-fifty mixture of coke and breeze. The employment of breeze in a producer became of increased importance when waste-heat boilers were installed, for in this case there was on their hands a quantity of breeze which would otherwise have been employed for steam raising. Its use in a producer provided an outlet for this breeze.

MORE ABOUT SCURFING.

With regard to scurfing by the water gas process, it had been put forward that graded coke was necessary. This might be the case with retorts of a small axis, but it was not so with retorts of larger axes. Mr. Finlayson had stated that in the scurfing process, when the retort was operated under normal heating conditions and at level gauge at the gas offtake, a good quality of water gas was made to the extent of about 75 c.ft. per 1 in. retort major axis per hour. On this basis they should be getting 7000 c.ft. per hour at Margate, while actually they were obtaining only about 4500 c.ft. The water gas process had an effect on the scurf, and changed its character. It was not possible to remove all the scurf by the water gas process, which really was an advantage. Examination of the scurf after the process showed it to have become much more porous. At Margate the retorts had been worked for 136 days without scurfing. A retort was then shut-off and examined; and it was found that the scurf extended nearly the whole way across the retort. Mr. Prater concluded his remarks by observing that the swelling index of coals was of great interest.

THE FLEXIBILITY CLAIM.

Mr. E. E. CALVERT (Gas Light and Coke Company) said he had been very interested in the author's description of the Dawsholm scheme, where one kind of coal could be dealt with in the continuous verticals and another variety in the intermittent chambers. He would like to know if it would be possible to design a retort with a modified minor axis and 18 in. at the bottom, which dimensions might be more suitable for carbonizing Durham coals. Speaking of the flexibility of the vertical system, the author had not mentioned the time and care which were necessary to alter the temperatures of the settings and to adjust the amount of steaming when a change was made in the throughput. When waste-heat boilers were installed, alteration in throughput meant adjustment of the boiler operation, and so on. Mr. Finlayson had said that the capital cost and the working cost of vertical installations were low. Could he give them any figures relating to the wear and tear of the plant, on the per ton basis, over a number of years?

IN PRAISE OF INTERMITTENTS.

Mr. WALTER GROGONO (Croydon Gas Company) observed that it was easier to work intermittent chambers than continuous vertical retorts; and he was sorry that the author had not given any comparisons between the two systems. Personally, he was much impressed by the intermittent chamber system. It was very flexible. Steaming could be carried out for any length of time, and it was possible to burn off the charge for any period. If, for example, 12-hour working was the practice, and the stock of gas was great,

it was easy enough to lower the temperature of the settings by adjusting the main damper in the chimney, and thereby put the plant on 18-hour working. Moreover, it was easier to make a higher quality gas with intermittents than with verticals. In this country they had many water gas plants making gas of from 390 to 400 B.Th.U. per c.ft. This figure implied the use of one gallon of oil to every 1000 c.ft. of gas made, which, with the present high price of oil, was about the economic limit. Well, if they installed vertical retorts, these could be worked most economically when producing a gas of about 510 B.Th.U. from Durham coals. This low calorific value allowed little latitude for the addition of water gas of 400 B.Th.U. quality. Mr. Finlayson had mentioned that the coke produced by verticals was suitable for burning in well grates. In London the bulk of the coke trade was for domestic hot water boilers, for which purpose small coke was desirable and necessary. Now if the vertical coke was broken, a good deal of dust was produced, because of its friable nature. Coke produced in intermittent chambers, on the other hand, cut well and made little breeze. In this country there was at present only one intermittent chamber plant, he believed, though he understood that four more were being built. That they had been successful on the Continent was proved by the fact that one German firm alone had been responsible for the erection of 450 plants. The lack of progress in intermittent chamber plants in this country was due to the war; and though intermittent carbonizing might to some appear a retrograde move, actually he thought it was a step forward. After all, the intermittent system relied for its working solely on gravity; there was no machinery to get out of order. Also, scurfing was effected more quickly in intermittent chambers than in continuous verticals; and in the former system examination was much easier. With the vertical retort there were layers of cold coal, hot coal and hot coke, and cool coke. The constant stream of cold coal was bad for the silica of the retort. It was, in fact, rather like pouring a stream of cold water on to hot silica. With the intermittent system, the retort was only subjected to the effect of cold coal for a short time on charging. As a matter of fact he had inspected intermittent chambers which had been at work for eight years, and they looked like new. There was certainly no question of rebuilding them.

Shape of Retort and Scurf Formation.

Mr. J. H. GOLDSMITH (South Suburban Gas Company) said he understood that the Woodall-Duckham vertical had a square section.

Mr. FINLAYSON: The corners are rounded slightly.

Mr. GOLDSMITH suggested that the greatest thickness of scurf appeared to be deposited at the corners of the retort section. Did the more rounded section of the intermittent chamber help to prevent scurf formation?

Need for Blending.

Mr. R. J. PEPPER (Gas Light and Coke Company) emphasized the need for research into the problem of blending swelling coals with those of a non-caking variety. By suitable blending, the throughput was increased, owing to the elimination of the plastic layer. There was a further important point in regard to blending. If, with the increase in the number of vertical installations there was a constant demand for the best-quality coals, these would inevitably advance in price and eventually run short. From the aspect of national fuel conservation, it was essential that attention be paid to blending of coals.

Choice of Plant for Different Circumstances.

Dr. E. W. SMITH (Technical Director, Woodall-Duckham Companies), having congratulated Mr. Finlayson on his lucid paper, said he was disposed to support Mr. Grogono in regard to his preference for intermittent vertical chambers for those undertakings where the system was the most suitable. He did not think that the author would suggest that continuous vertical retorts had universal application, but, rather, that they had the greatest application of any system being constructed. He (Dr. Smith) believed, like Mr. Pepper, that if gas undertakings concentrated only on the best coals —*i.e.*, best in regard to size, volatile matter, ash, and so on—there would come a time when the price would go up. The result would be that a worse class of coal would have to be purchased. And, as blending would have to be adopted—there was no doubt about this—intermittent vertical retorts would have a big vogue. It was, of course, no use thinking that blending could be carried out by following up a batch of 50 p.ct. of one coal by 50 p.ct. of another. Mechanical means were necessary to secure an intimate mixture, to obtain the maximum beneficial effect from blending. No one would claim that pulverized fuel could be carbonized efficiently in continuous vertical retorts. He agreed that for run-of-mine slacks, and even smaller sizes, the intermittent system was the easiest to work; but it did not follow from this that it was necessarily the cheapest. He would let Mr. Grogono have a series of comparative figures to demonstrate this point. On the question of supervision, it was, of course, impossible to run a vertical retort installation with the supervision of twenty years ago; and if any engineer wished to go back to less supervision, it was a fact that intermittent retorts did require less. But even intermittent retorts gave trouble with a highly swelling coal—as Dr. W. B. Davidson had found at Birmingham. Nowadays, though, it was the fault of the engineer if he experienced such trouble. By knowing his coals, and by blending, there was no reason why he should experience difficulty with intermittent retorts.

Coke Quality.

Dr. Smith then referred to the question of coke quality. One of the difficulties of a new and different carbonizing installation, he said, was the effect on the local coke market. When intermittent vertical retorts were introduced into the Midlands, where the consumers had grown accustomed to vertical coke, at first they would not have the intermittent coke, but insisted on the continuous. The explanation of this was that the continuous coke was well screened and quenched, whereas the intermittent coke was badly quenched. There was no doubt, though, that if the intermittent coke was subjected to similar screening and careful quenching, it was as good as continuous coke having the same moisture and ash contents, and of the same grading, for small hot water boilers. Dr. Smith said he would not like it to be thought that the Woodall-Duckham Company were merely a "whole-hogger" continuous vertical retort concern. This was not the case. They had endeavoured to get the best continuous verticals, intermittent verticals, and coke ovens, so that they could supply the particular plant most suitable for any definite set of conditions. Local conditions and markets constituted the ruling factor in the choice of a carbonizing plant.

The Author's Reply.

Mr. FINLAYSON thanked his audience for their reception of his paper and for the excellent discussion. As Mr. Lacey had observed, at the present day there was little difference in labour costs per ton between a modern continuous vertical installation and an up-to-date machine-charged horizontal plant when both were making a 500 B.Th.U. gas; but there was an advantage with the continuous verticals if the basis of calculations was the therm, because this type of plant gave an increased thermal yield per ton. It was also correct to state that the time lost in scurfing continuous verticals was greater than that lost in the same operation with intermittent verticals. Scurfing was a function of output per unit of ground space; and on this basis the difference between the two systems was not so marked. He agreed that, if a gas of a calorific value above 465 or 470 B.Th.U. was being made, it was impossible to work a proper scurfing cycle. With regard to the steam raised, which was put at 1500 lbs. from and at 212° Fahr., it was the custom to absorb the heat from the waste steam from the turbo-blower for heating the boiler feed water. The figure related to the latest type of setting, like that at the Bow Common Works of the Gas Light and Coke Company.

With regard to Mr. Prater's remarks on auxiliary secondary air, the object was to provide the opportunity for zoning heats. With the modern type of setting, with less recuperation, and consequently with the secondary air at a lower temperature, high middle and good bottom heats could be obtained without using auxiliary secondary air. Then Mr. Prater had suggested there was no reason why the retort length should be limited to 103 in. From the point of view of heating, travel of the charge, and brickwork, there was no reason why it should not be larger; but they had to consider such factors as the design of the coke extractor at the bottom of the retort.

Then they came to the question of top ironwork. He had recently had the opportunity of watching five designs of ironwork, and he could confirm Mr. Prater's remarks upon the low temperature of the gas at the offtake with his type of feed. But the offtake temperature was only one factor; and he (the speaker) found that the best all-round results were given by the type of feed illustrated in the slide he had shown. As for the hydrogen content of the gas, he would point out that Mr. Prater was making a 460 B.Th.U. gas, which calorific value implied a fairly large proportion of water gas; and 53 to 54 p.ct. of hydrogen could be regarded as a normal figure.

Dealing with the primary air to the producer, Mr. Prater was correct in assuming that the slide showing the doors slightly open was of an older type of producer. The newer settings were working with the primary air to the producers under pressure. He congratulated Mr. Prater on the analyses of his producer gas when using coke or coke breeze. Confirmation of these figures was to be found in the work of Mr. Tomlinson at the Nechells Works of the Birmingham Corporation Gas Department when he was employing approximately the same mixture.

Mention had been made of the use of graded coke in the scurfing operation. Perhaps the fact that Mr. Prater had used fine coke mitigated against the output of water gas per inch of retort length; but the 75 c.ft. per inch was a definite test figure, and was borne out by the experience of Mr. T. F. E. Rhead, the Chief Chemist at Birmingham. With regard to Mr. Calvert's suggestion about the taper of the retort, experience showed that neither throughput nor operating conditions were improved by reducing the dimensions at the top. As for maintenance costs, these had been given in a recent paper before the Southern Association of Gas Engineers and Managers as 10d. per ton. Dr. Smith had dealt with Mr. Grogono's remarks; but he (Mr. Finlayson) would emphasize that the attitude taken by the Woodall-Duckham Company was that continuous and intermittent verticals were complementary. Blending should be used to obtain a good coke from a poorly caking coal by mixing the latter with a coking coal.

The cost of the water gas therm had been mentioned; but he was under the impression that with present-day prices it was impossible to make a therm of water gas in a carburetted water gas plant as cheaply as they could make the therm of coal gas-water gas in a continuous vertical or an intermittent vertical retort. With regard to the charging and discharging of intermittents, he suggested that mechanically the latter could not compare with verticals. The door on the intermittents had to be hydraulically operated. Mr. Goldsmith had asked whether the shape of the retort affected the deposition of scurf. As far as he (the speaker) was aware, this did not make a great deal of difference. Scurf formation was more a function of temperature and the type of coal being carbonized. Blending was bound to come; and if this was so, the intermittent vertical chamber would have a large application. Dr. Smith had spoken of the coke market. When intermittent coke was properly screened and quenched, it was satisfying people who formerly were using horizontal coke.

Vote of Thanks.

Mr. D. CLEAVE CROSS (Lea Bridge), in proposing a vote of thanks to Mr. Finlayson for his paper, suggested that vertical retort enthusiasts were apt to overstep the mark in claiming so many benefits for the vertical system. The type of plant to be decided upon depended on the locality of the particular gas-works and also upon the declared calorific value the undertaking had adopted. He thought, too, that the modern car-

bonizing plant was apt to be regarded as a steam-raising unit. [Laughter.] He had noticed, for instance, that in the figures given by Mr. Finlayson 31 p.ct. of the heat in the producer gas was utilized for heating the setting, while no less than 45 p.ct. was employed in the boilers. Engineers generally, he thought, were laying too much stress on this point. Another factor which was often emphasized too strongly was that of flexibility. He considered that for most works in the country —leaving out the Metropolitan concerns and the large provincial undertakings—a retort capable of carbonizing 10 tons a day was too big a unit. Suppose, for example, that an undertaking could produce its gas in two retorts each of 10 tons a day capacity. When one retort was laid off for scurfing, 50 p.ct. of the plant was more or less lying idle. They had heard from a previous speaker that the throughput of a retort could be varied from 4 to 12 tons a day. Surely it was better to work all units at their maximum capacity; and the corollary to this was to have more retorts of less capacity, and to work a number of these at their full capacity. Mr. Cross concluded his remarks by saying that though it was feasible to scurf the retorts by the water gas process if the declared calorific value of the gas was 460 B.Th.U. per c.ft., it was not practicable if the undertaking happened to be supplying a gas of (say) 505 B.Th.U.

Mr. PRATER seconded the vote.

Mr. FINLAYSON, in replying to the vote, said that, with regard to steam raising by vertical settings, if the gross fuel consumption used in the producers was higher with continuous verticals than with horizontal retorts, then there might be some reason for complaint that the former were steam-raising plant. But actually they used a lower gross figure and yet gave more steam.

The PRESIDENT then welcomed new members of the Association.

VERTICAL INTERMITTENT CHAMBER OVENS FOR GAS MANUFACTURE.

By N. J. BOWATER, O.B.E., B.Sc., Assoc M.Inst.C.E.

[Paper before the Institute of Fuel, Nov. 24.—MR. JOHN TERRACE, M.Inst.C.E. (Chief Engineer of the South Suburban Gas Company, and Vice-President of the Institution of Gas Engineers), presiding.]

In the valuable paper read before this Institution in December last by Mr. Thomas Hardie, M.Inst.C.E., on "Some Phases of Modern Practice in Gas Manufacture," an illuminating insight was provided into the progress that has taken place in carbonizing practice, both with horizontal retorts and with continuous vertical retorts, during recent years. The object of the author of this paper is to supplement the above information by giving the Institute particulars of the recent developments that have taken place on the Continent in the vertical intermittent chamber oven process of carbonization.

At first sight it might appear (after the progress that has been made in the continuous carbonization process in this country) as though the installation of an intermittent process were a retrograde step; but it is believed that a careful consideration of the matter and the factors influencing the German developments of the process will demonstrate that this is not the case.

In England, for many years past, low coal prices have been the rule, due to the large and widely distributed coal deposits, and to the possibility, in many cases, of the coal being cheaply rail or water borne to its point of consumption where not consumed locally.

Other countries have not been so favourably situated; and Germany, in order to compete with English coals, water borne to her coast towns as well as many inland towns, was forced, many years ago, to establish a selling organization for the disposal of the products of her mines—a selling organization which to-day embraces practically the whole of the coal mines in that country. Coal producers in this country, owing to their happy position in being able, up to now, to dispose of their coal to local industries, have not so far found it necessary to adopt similar measures, with the result that the coal consumer generally contracts with the actual coal producer for the particular coal he requires.

On the other hand, in Germany, owing to the selling organization above referred to, it has always been a difficult matter to ensure getting a particular coal. Consequently, as the continuous vertical system of carbonizing is more exacting as to the quality and grade of coal which it can employ, German gas engineers have not favoured the installation of continuous vertical retorts, but have preferred intermittent systems, both horizontal and vertical, owing to their ability to carbonize satisfactorily a much wider range of coal, as to both quality and grade.

Though the German method of coal sales has not yet been adopted in this country, there are definite signs that some similar arrangement will be introduced before long; and as the era of low coal prices is likely soon to be a thing of the past, it behoves gas engineers, when considering their future requirements of carbonizing plant, to allow for this situation and not unduly to tie their hands as to the coal they may employ.

As a result of the situation described, German gas engineers have favoured intermittent vertical chambers, combining, as this system does, many of the advantages of both horizontal retorts and continuous vertical retorts. In addition to the above, there are other factors which have influenced the German gas engineers, and have, the author thinks it will be agreed, justified their preference for the vertical intermittent system.

The introduction into this country of the intermittent vertical system just before the war was interrupted by the outbreak of hostilities; and it is only comparatively recently that interest has again been aroused in the matter. The absence of further developments in this country during the war is understandable, as not only were most English gas-works contractors not interested in the intermittent chamber oven or retort system, but they were definitely interested in other types of carbonizing plants, such as horizontal retorts and continuous vertical retorts, while the stress of the war conditions, and the special calls made upon them, naturally rendered gas engineers, of necessity ignorant of the developments being made on the Continent, disinclined to go in for new developments of this kind.

In Germany, however, the intermittent vertical chamber ovens continued, and continue, to progress, not only for small gas-works, but for large installations; and the reason for their adoption is more readily understandable when the advantages of the system are considered. In view of the re-awakened interest in this country, some of these advantages may be briefly enumerated as follows:

(1) The coal is charged into the chambers from a simple container, by means of gravity, and is similarly discharged, thus doing away with the charging and coke pushing apparatus associated with horizontal retorts or ovens, and the continuous mechanical feed and coke extractors associated with continuous vertical retorts.

(2) The coal during carbonization lies quiescent in the chamber as in horizontal retorts, and is not subjected to the continuous movement that occurs in continuous vertical retorts; the result being the formation of a strong coke (from any reasonably caking coal) and only an extremely small proportion of breeze. As will be seen later on under Table I., this proportion of breeze is practically negligible with a good caking coal.

(3) Owing to the conditions described in (2), the choice of coals for the intermittent vertical chamber ovens is very much wider than for continuous vertical retorts, and any coal suitable for horizontal retorts is suitable for vertical chamber ovens. The advantage of this factor is not only one of convenience, but is also frequently of considerable financial importance to a gas undertaking.

(4) Steaming of the coal in the vertical intermittent chambers may be accomplished as in continuous vertical retorts, thus permitting a high gaseous therm production per ton of coal without the employment of water gas plant.

(5) The ground space occupied per ton carbonized and per therm of gas yield is very low, probably as low as continuous vertical retorts, and much lower than horizontals; one ton of coal carbonized per day per 2c sq. ft. of ground space occupied being obtained with intermittent vertical chambers.

(6) The carbonizing period can be varied according to the gas requirements from about 12 hours upwards; and by suitable timing of the charging and discharging the whole of the carbonizing labour can be reduced to two 8-hour shifts per day, there being, of course, during the 24 hours one 8-hour or two 4-hour periods when no carbonizing labour need be present.

(7) As the corollary of (1) and (6), the labour costs are low. Furthermore, even during the 8-hour shifts only one man is required for coal charging and one man for coke discharging for a chamber bench having a capacity of up to 120 tons per 24 hours, while there is no continuously operating machinery requiring attention.

(8) Maintenance costs are extremely low; there being neither expensive mechanical coal charging machines nor coke

extractors. Consequently the risk of breakdown of machinery is also reduced. High combustion chamber temperatures and quick heat transmission are obtained by the employment of silica refractories; while, owing to there being no movement of the coke in the retort until it is finally discharged, and the final movement being a vertical one, the wear and tear on the retort walls is considerably less than with horizontal and continuous vertical retorts.

(9) The vertical chamber ovens lend themselves to the widest variation in individual capacity to suit the different operating conditions and the capacity of the carbonizing plant as a whole. The ovens are built in sizes of from 1 to 7·5 tons capacity, and can be grouped in their settings as desired.

The regenerative or recuperative system of heating permits of low fuel consumption per ton of coal carbonized; and while, for small installations, self-contained gas producers are customary, large installations are generally heated by independent outside producers gasifying any breeze that may be formed or other inferior fuel. Considerable economies may be effected by this means; but these do not belong particularly to the advantages of the intermittent chamber ovens.

There are, of course, other advantages in the use of the intermittent chamber ovens, such as the fact that the oven is opened and emptied once every 12 to 16 hours, as the case may be, when it can be inspected just as in the case of horizontal retorts. Scurfing is also a simple matter, and has only to be performed about every eight to ten weeks; the operation lasting about sixteen hours.

In modern intermittent chambers the coke discharge is carried out with ease and certainty, for, owing to their design, what may be described as their specific skin-friction per unit weight of charge is low. As previously explained, the intermittent chamber oven system is being more and more utilized on the Continent, and its employment in this country is bound to follow. Large plants are, indeed, already in course of construction over here.

In continuous vertical retort practice the sensible heat of the coke, prior to discharge, is utilized for the superheating of steam and for the manufacture of water gas. In intermittent vertical chamber ovens this absorption of sensible heat is only possible to a limited extent, as steaming, for obvious reasons, is only carried out during the last hours of carbonizing. The sensible heat of the coke, however, can be recovered in the form of steam by means of dry coke quenching plants; and it is only the high initial cost of these plants which is hindering their wider employment.

The modern intermittent chamber oven is so constructed that the coal rests in the form of a tapered slab on end, from 12 to 16 ft. high. Other dimensions depend on oven capacity, and coal thickness upon the time of carbonization required. For example, a chamber having a capacity of 2·5 tons per charge, or 5 tons per day with 12-hour charges, would be approximately 11 in. in width, 9 ft. 6 in. in length, and 15 ft. in height. A number of these would be grouped together side by side in a common setting, with the necessary heating flues and with its own recuperator or regenerator for preheating the air or air and producer gas, as the case may be, according to whether the chambers are heated by hot gas generated in producers built into the setting, or by cold, clean gas generated by outside producers.

A number of these settings are then grouped together, braced and tied by means of suitable buckstays, &c., and form a bench or battery along which run the common mains for foul gas, tar, heating gas, and steam.

Gas off-take pipes are provided, of course, for each chamber, and are connected, preferably, with separate hydraulic seal pots for enabling each chamber to be isolated from the common foul gas main when discharging and recharging; the gas off-take pipes being also continually sprayed in the more modern installations to avoid any possibility of blockage.

The charging is done by means of a coal bus, which loads from an overhead bunker and runs along the whole bench of chambers. The bus holds sufficient coal for completely charging a chamber, as well as sufficient coke breeze for filling up the bottom of the chamber. The first movement of the charging lever usually opens up the breeze hopper; the continued movement of the lever then opening the coal hopper.

Steaming, as already stated, is usually carried out during the last few hours of the carbonizing period; the amount depending upon the ultimate calorific value of the gas required.

Carbonizing temperatures are, of course, similar to English practice, and silica refractories are now universally employed for the chamber itself and the combustion chambers.

When an efficient recuperative system is employed, and the producer gas is also preheated, the flue gases are usually so reduced in temperature (about 300° C.) that they only suffice to create an adequate stack draught, or at the most serve for the generation of hot water. Where, however, it is desired to generate steam by means of so-called waste heat, sufficient of the flue gases can be by-passed for the purpose, with, of course, an increase in fuel consumption.

Steam jacketed, independent producers, however, enable more steam to be generated than is required by the producers themselves; and this can be still further augmented by supplying the producer steam jacket with hot water, heated by the waste flue gases, and also by recovering the sensible heat of the producer gas itself in waste-heat boilers.

Intermittent vertical chambers may be heated, as explained, by means of self-contained producers, gasifying the coke as produced, or by means of independent producers—*i.e.*, by the cold, dust-free gas generated in such independent producers gasifying coke breeze or even bituminous slack.

When self-contained producers are employed, hot flue gases are available for steam raising; but when independent producer gas is utilized for heating the bench, the flue gases, as already explained, usually only suffice for hot water generation.

In larger installations—say, over 50 tons per day—material financial advantages can be shown in favour of the outside producer method of heating, partly due to the possibility of their utilizing low value fuel, where such is available, and partly due to the improved operating conditions and longer life of the setting. The uniformity of heating by means of clean producer gas is very marked as compared with the heating by means of self-contained producers, where irregularities in the quality of the gas, &c., are inevitable, owing to the intermittent nature of the clinkering operations.

The gas and air for combustion are easily and exactly controlled by means of ordinary hand-operated metal valves, whereas with built-in producers (the gas and air being controlled by dampers) no such acuracy is obtainable. Furthermore, the dust-free gas not only assists in this regularity of heating, but ensures a long life to the ovens and a continued efficiency of heat transfer to the coal charge, owing to the absence of dust in the combustion chambers and flues.

The heat required for carbonization in the form of cold, clean producer gas is in the neighbourhood of 25 therms per ton—dependent, of course, upon the calorific value of the distillation gas (that is to say, upon the steaming required and the moisture in the coal).

Table I. is appended as an example of what can be done with an installation of intermittent vertical chamber ovens when carbonizing a Durham coal (Londonderry) in a small setting of seven chambers having a capacity of approximately 2 tons of coal each; the setting being provided in this case with self-contained producers.

TABLE I.

Gas produced per ton of coal carbonized	15,480 c.ft.
Calorific value of gas at 60° Fahr. and 30 in. Hg.	537 B.Th.U. per c.ft.
Therms per ton	83·2
Analysis of coal—	
Moisture	1·08 p.ct.
Ash	8·60 ,,
Volatile	31·48 ,,
Fuel consumption	14·1 ,, 2·82 cwt. per ton carbonized
Saleable coke—*i.e.*, Coke over ⅜ in. / Coke produced	99·5 p.ct.
Waste heat recovery possible from flue gas leaving setting at 650° C.	700 lbs. per ton carbonized
Waste heat recovery possible from dry cooling of coke	700 lbs. per ton carbonized

These results, obtained under normal everyday operating conditions, are, the author believes, superior to any that have been obtained in other types of carbonizing plant.

In Table II. is given a thermal balance for the process, similar in form to the thermal balances published by Mr. Hardie in his paper previously referred to.

For the purpose of comparison, Mr. Hardie's Table II. is also reproduced on the next page.

The chief points of difference are seen to be in the gas and the coke production. The therms in the gas produced in the intermittent vertical chamber ovens are 5·4 p.ct. more, and the therms in the coke appear slightly more also than in the case quoted by Mr. Hardie. The thermal efficiency of conversion is consequently 96·8 p.ct., as against 95·84 p.ct.

The reason for the increased gaseous therm production is at first sight not clear, but, apart from the slightly increased volume of gas, an analysis of the gas (see Table III.) shows that the CH_4 is high, as are also the unsaturated hydrocarbons, which together account for its high calorific value and other results.

Table III. also shows the analysis of the gas obtained at the Fuel Research Board's Station when carbonizing other Durham coals in continuous vertical retorts and steaming to different degrees.

Steaming, as already explained, is only carried out with intermittent vertical chamber ovens during the last two or three hours of the carbonizing period—*i.e.*, when the coal charge has reached its maximum temperature. Consequently the percentage of the steam introduced that is converted to water gas is high, and the calorific value of the water gas produced is also high, while at the same time it might here be remarked that no undue dilution of the liquor occurs.

The high percentage of unsaturated hydrocarbons is due to the quick removal of the gaseous products and their subsequent

TABLE II.—*Carbonization of Londonderry Coal in Vertical Intermittent Chamber Ovens.*

	B.Th.U.
Potential energy of coal—	
1 ton at 13,600 B.Th.U. per lb.	= 30,464,000
Products of carbonization—	
Gas, 15,480 c.ft. of 537 B.Th.U. per c.ft. . .	8,320,000
Tar, 11 galls., at 18,181 B.Th.U. per gall. .	2,000,000
Coke, 13·8 cwt., at 12,700	19,174,000
Heat in combustible products	29,494,000
Thermal efficiency of conversion	= 96·8 p.ct.
Products used on works in process—	
Coke for heating retorts, 2·7 cwt., at 12,700 B.Th.U. per lb.	3,840,000
	B.Th.U.
Products for disposal to public—	
Gas	8,320,000
Tar	2,000,000
Coke, 10·78 cwt., at 12,700 B.Th.U. per lb. .	15,384,000
	25,654,000
Assuming steam raised from waste heat, surplus over requirements for power and gas production	600,000
	26,254,000

Commercial efficiency of process, 86·15 p.ct.

TABLE III.

Londonderry Coal in Intermittent Chamber Ovens, Pintsch-Otto System.		Other Durham Coals in Continuous Vertical Retorts Steamed to Varying Extents.					
		Consett Coal.(1)		Wearmouth.(2)	Holmside Coal.(3)		
Steaming, p.ct.		5·24	20·95	20·05	5·05	12·54	20·21
CO_2	2·77	1·75	4·40	5·20	1·7	3·3	4·8
C_nH_m	2·84	2·40	2·10	2·00	2·3	2·2	2·0
O_2	0·32	0·40	0·25	0·20	0·3	0·2	0·1
CO	12·10	9·05	12·60	14·50	9·6	10·2	11·0
H_2	47·30	56·15	57·20	54·15	54·5	56·4	54·8
CH_4	26·04	23·80	19·20	19·25	24·5	22·8	20·9
N_2	8·63	6·40	4·10	4·70	7·1	4·9	6·4
Calorific value, B.Th.U. per c.ft.	537	518	463	473	524	504	480
C.ft. per ton . .	15,480	13,590	17,080	18,640	13,200	14,400	15,940
Therms per ton .	83·2	79·4	79·08	88·17	69·17	72·78	76·51
Therms per ton calculated on an ash and moisture free basis .	92·2	80·1	89·5	97·6	74·3	78·5	82·6
Therms per ton on a 500 B.Th.U. basis	101	84		92·5	79·3		

[1] Fuel Research Board's Report for 1920-1921.
[2] Fuel Research Board's Technical Paper, No. 14.
[3] Fuel Research Board's Technical Paper, No. 15.

passage through cooler zones, while the high percentage of CH_4 is probaly due to the temperature of carbonization during the test in question not being excessive, which, perhaps, raises the question whether the practice of high combustion chamber temperatures, in order to obtain the maximum throughput of the plant, is not sometimes carried to excess.

The commercial efficiency in the case of the intermittent vertical chambers (Table II.) is also slightly higher—86·15 p.ct. as against 85·6 p.ct.—but this small difference is only retained so long as the money value of the breeze produced is based solely on its calorific value. A true commercial efficiency would be influenced by the fact that the breeze value is not usually commensurate with the calorific value. Consequently the difference in the actual commercial efficiency is really higher. Furthermore, the increased gaseous therms are more valuable than the average thermal value of the products for disposal to the public.

A plant, for example, that produced one more gas therm and three less coke therms than another—a net reduction of two therms would, commercially, be just as effective, because the coke therm is only worth one-third of a gas therm (say 1·2d. per therm for the coke, as compared with 3·6d. per therm for the gas).

As is now well known, continuous vertical retorts operate more satisfactorily, and give a higher throughput, as well as gaseous therm production, when carbonizing a graded coal, whereas intermittent chamber ovens, with regard to both the type of coal and its grading, are much less exacting. In view of this, the possibility arises, where continuous vertical retorts already exist, of removing the slack from the coal supplied, which slack is then carbonized in intermittent vertical chambers, leaving the nuts for the continuous verticals. By this means, the throughput of the continuous vertical retort plant would be increased without any increases in the over-all cost of the fuel, apart from the screening, or, alternatively, the

TABLE II. (Mr. Hardie).—*Carbonization of Coal in Continuous Vertical Retorts, with Waste Heat Recovery.*

	B.Th.U.
Potential energy in coal—	
1 ton at 13,400 B.Th.U. per lb.	= 30,016,000
Products of carbonization—	
Gas, 15,300 c.ft. of 510 B.Th.U. per c.ft. . .	7,803,000
Tar, 11 galls. at 18,181 B.Th.U. per gall. . .	2,000,000
Coke and breeze, 13·83 cwt., at 12,242 B.Th.U. per lb.	18,964,400
Heat in combustible products	28,767,400
Thermal efficiency of conversion	= 95·84 p.ct.
Products used on works in process—	
Coke for heating retorts, 2·62 cwt., at 12,500 B.Th.U. per lb.	3,668,000
All power from waste heat steam, and similarly steam to retorts.	
	B.Th.U.
Products for disposal to public—	
Gas, 15,300 c.ft., at 510 B.Th.U.	7,803,000
Tar, 11 galls.	2,000,000
Coke, 9·79 cwt., at 12,500 B.Th.U. per lb. .	13,706,000
Breeze, 1·42 cwt., at 10,000 B.Th.U. per lb. .	1,590,400
Steam, surplus for other purposes not required for power or gas production . . .	596,000
	25,695,400

Commercial efficiency of process, 85·6 p.ct.

operation of the verticals would be permitted with a cheaper coal, which, without previous grading, would have been unsuitable for, or difficult to carbonze in, continuous verticals.

It should, perhaps, be stated that too close a comparison must obviously not be made between the above two Tables II., but it is at all events clear that the intermittent vertical chamber ovens have much to be said in their favour, and warrant the most serious consideration of gas engineers when contemplating extensions to, or renewals of, their carbonizing plant.

Discussion.

Mr. E. G. STEWART (Gas Light and Coke Company) said that Mr. Bowater had made some appreciative references to a paper read by Mr. Thomas Hardie at last year's meeting of the Institution of Fuel Technology. Unfortunately, Mr. Hardie was unable to attend for the purpose of discussing Mr. Bowater's paper, but had suggested that he (Mr. Stewart) having had some acquaintance with intermittent verticals, might take part in the discussion. Until recently, continued Mr. Stewart, intermittent verticals had hardly entered into British gas-works practice, and no doubt there had been reasons for this. On the Continent, on the other hand, they had been greatly developed from the original Dessau retort, and recently there had been all sorts of tales coming to this country as to the remarkable results now being achieved by the improved intermittent verticals. As a result there had been a number of private visits of inspection paid by various gas engineers of this country; and he believed some of those visits had resulted in the placing of orders. He thought he recognized the figures given by Mr. Bowater in his paper as being the results of a test carried out for the Gas Light and Coke Company with a special sample of English coal on an installation on the Continent. That test was closely scrutinized and supervised during the whole week it had taken place, so that the figures could be accepted as being perfectly genuine, and as representing exactly what one might expect with these intermittent verticals. With regard to Mr. Bowater's statement that the good carbonizing results were in a measure due to the high production of methane and hydrocarbons, and that the results would show up better if the figures of methane and hydrocarbon production had been taken out as cubic feet per ton of coal, he agreed that this was very much the case. Mr. Bowater had also mentioned that he had no figures of comparison with the coal actually used on that test. It so happened, however, that he (Mr. Stewart) was in possession of figures obtained on various systems of carbonization with that same coal—or what was reputed to be a portion of the same coal—and he could say off-hand that, whereas in the intermittent verticals the methane production was 4000 c.ft. per ton, with practically every other system of carbonization tried a figure of only 3600 c.ft. per ton was obtained. In the same way, the production of hydrocarbons with the intermittent verticals worked out at about 439 c.ft. per ton, whereas with most of the other systems it was somewhere between 320 and 360 c.ft. per ton. It was evident, therefore, that in some manner or other there was a better carbonizing condition inside the intermittent retort than in other systems—and in referring to other systems he was not confining his remarks to vertical retorts entirely. The figures were borne out by the Fuel Research Board tests, which gave results between 3200 and 3600 c.ft. per ton. Without a good deal of further experience he would not care to express an opinion as to whether the plant constituted an improvement on anything they had had previously, or whether it was a retrograde step; but it did impress him as being remarkably simple to operate and extraordinarily clean for a process in which the retorts were opened periodically. It also had the advantage which had been claimed in the case of the double charging machines for the horizontal retort—namely, that if one desired to look into the retort, one had an opportunity of doing so every twelve hours. It was hoped that as their knowledge of refractories increased, it would not be so necessary to do this; but at the present time it was an advantage. Further, he believed it would be generally agreed that it was easier to control a charge which was standing still than a charge which was moving. Finally, referring to Mr. Bowater's remark that the use of clean producer gas enabled one to avoid the effect of ash on the silica, he said that the Gas Light and Coke Company's experience with

horizontal retort settings was that ash had no effect whatever on the silica work. There were retorts at Beckton which had been running for 1000 and 1200 days, and when they were opened it was found that the silica was as good as when it had left the maker's factory. Mr. Stewart thanked Mr. Bowater for the precise manner in which he had put the case for the intermittent vertical retort, and congratulated him upon the fact that there was a very refreshing absence from his paper of any trade bias.

Intermittent and Continuous Verticals Compared.

Mr. JOHN ROBERTS said that the author had made out a good case in favour of a retort which was likely to prove of service in gas-works practice. Intermittent verticals, he said, would probably be used extensively in the future, possibly also for the manufacture of a type of solid fuel which was eagerly awaited, but which was not mentioned in the paper. The paper, however, was not above criticism, as it suffered from over-statement. A paragraph in the early part of it gave the impression that the scope of continuous verticals was strictly limited; but, as a matter of fact, almost any coking coal could be carbonized in these retorts. With regard to the first of the advantages claimed for the intermittent system, Mr. Roberts said he did not agree that an intermittent retort, charged and discharged as described, possessed advantages over continuous verticals. One had only to watch both types being operated in order to appreciate the pronounced advantages of the latter. In the charging of intermittents, clouds of dust and smoke were discharged into the atmosphere, and during discharge a mass of nearly 2 tons of red-hot coke dropped into a wagon. He invited the author to contrast this system with the completely enclosed arrangements for feeding the retort and cooling the coke in continuous vertical retorts. It should also be pointed out that the mechanical arrangements for the feed were not continuous, but intermittent, in the continuous verticals—a lever being operated every two hours to charge the auxiliary hopper. With regard to advantage No. 5, he asked the author to state what the 20 ft. of ground space included; presumably it represented only the actual bench space. One could not carbonize coals with bench space only, however; and the author should have stated the area of the retort house. As to the statement, in advantage No. 9, that the ovens were built in sizes of 1 to 7·5 tons capacity, he asked for the dimensions of the retort of 7·5 tons capacity. Presumably the width of the retort would not be increased. The author had stated that coke cooling plant might be installed as an adjunct to the system. It must be remembered, however, that the cheapest form of coke quenching was that employed in continuous verticals. Referring to Table I., he said the author had given the waste heat recovery possible from the flue gas leaving the setting, and that possible from dry cooling of coke. The word "possible" was used twice in connection with the waste heat recovery, but if the figures in the table were actual results obtained under normal conditions, why not substitute the word "actual?" The author believed his results to be superior to any that had been obtained in other types of carbonization plant; but in this connection Mr. Roberts asked whether Mr. Bowater had any means of getting information as to the performances of modern plant of a similar type, but of different design, in this country, because the claim was a broad one to make in the absence of such information. The comparison shown in Table III., of a Londonderry coal with Holmside coal, could not be a comparison of retorts, since the latter coal was not to be compared with the former in quality. A similar remark applied to Table II. The Londonderry coke was of higher calorific value than the other, having been made from a better coal. Examining the heat balance, Mr. Roberts said there appeared to be a loss of 0·32 cwt. of coke in Table II. (10·78 + 2·7 = 13·48, whereas the author's figure was 13·8).

Mr. BOWATER said this was a printer's error.

The Author's Heat Balance Queried.

Mr. ROBERTS replied that he did not see where this came in. The point he wanted to make was that there was an error in the B.Th.U. column for coke; the figure should have been 19,629,120. There was another error in the gas figure, which should read 8,312,760. A third error had crept into the coke sale figure, which should read 15,333,472. These errors disturbed the whole heat balance. A more serious error occurred, however, in the tar figures. These could not have been obtained from a test, as they had been "borrowed" from Mr. Hardie's figures, which, as originally printed, contained a typographical error, which misprint had been included in Mr. Bowater's heat balance. The calorific value should have been 181,800, instead of 18,181 B.Th.U. With regard to the 600,000 B.Th.U. surplus from waste heat, he said this would be obtained from the dry cooling of the coke, so that the cost of such an installation must be taken into account. The proposal in the penultimate paragraph had already been put into practice at the Dawsholm Gas-Works, Glasgow, where a plant having a capacity of 9 million c.ft. per day was in course of erection. This consisted of a combination of continuous vertical retorts and intermittent vertical retorts.

Satisfactory Intermittent Carbonizing at Moscow.

Dr. PAUL DVORKOVITZ referred to his experience of 72 intermittent retorts erected by a Dessau firm in 1912 at the gas-works at Moscow. It was true, he said, that the capacity of those retorts was not very great—they charged approximately half a ton each—but undoubtedly their performance was remarkable from the points of view of quantity and quality of gas, and also of the coke. After the plant had been installed practically ten years, it was still perfect. The repairs necessary had been the absolute minimum. The retorts were such that one could control completely the gasification and the carbonization of the coal. The period of charge was from 16 to 18 hours, and the control of heat had been maintained with the greatest satisfaction. Whether the experience with larger retorts, with capacities of (say) from 1 to 7 tons, would be equally satisfactory, he was not prepared to say. He agreed with the author that it was difficult to control the constantly moving charge in the continuous process. He had had occasion to inspect the continuous process at the Strasburg Gas-Works, where the arrangements were such that the quality of the tar produced was not satisfactory, and complaints were continually being received. Possibly this was due to the steaming of the retorts. Steaming might increase the quantity of calories, but the quality of the coke was quite different from what it would be otherwise.

Mr. E. G. STEWART, referring to Mr. Roberts's remarks as to the lack of cleanliness of intermittent verticals, related experiences to prove that, in fact, the working was not dirty.

Mr. ROBERTS said he had based his remarks upon personal observations of the plant; and if he were asked whether he would prefer to charge a refuse destructor or an intermittent vertical retort, he would prefer to charge the former. He was not disparaging the use of intermittent verticals; his point was that one over-stated the case if one claimed advantages for it in this respect over continuous verticals.

External and Built-in Producers.

Mr. A. H. LYMN remarked that when he had first seen a vertical intermittent chamber plant, the thing that had impressed him more than anything else was the extraordinary cleanliness; and he was rather inclined to think that if Mr. Roberts had inspected any dozen such plants on the Continent he would not have been so aggressive. With regard to the question of self-contained or outside gas producers, he (the speaker) said there seemed to be no doubt that in building an outside producer, where the gas was thoroughly cleaned and the dust taken out, one must secure, *ipso facto*, many advantages. One, of course, was that, owing to the gas being perfectly clean and cool, it could be passed through valves which could be accurately handled, and he ventured to say that with an outside producer plant, as applied to carbonizing, one could obtain combustion conditions more closely approaching the theoretical than one could with a self-contained producer. There was also, in some works, a very important advantage in relation to the fuel used. In the ordinary self-contained producer the same grade of coke was used as that which came from the retort or chamber. This had a value of (say) 25s.; but with a properly designed outside producer, with probably a water jacket or steam boiler jacket, one could use coke containing 25 p.ct. of ash, or even more. He could give examples of certain producers using coke containing 35 p.ct. of ash. They could employ coke of the value of 7s. It might be said, of course, that in many works there was not a poor-grade coke available; and he was bound to admit that this was so. With regard to Mr. Stewart's statement that in his experience of the firing of horizontal retorts he had not noticed that the dust contained in the coke had any deleterious effect upon the retorts themselves, Mr. Lymn said that a lot of research had been done which had proved that the ash resulting from the dust in coke did in fact increase the fusibility of the refractories, and thereby shorten their lives.

Mr. STEWART pointed out that he had referred to silica.

Mr. LYMN, continuing, said that a point against the system was that the sensible heat contained in the gas was lost by cooling, unless means were taken to recover it. In modern plants—and certain plants of this kind were being sent into this country—a waste heat boiler was used in combination with the gas cooler, and by this means it was found possible to obtain as much as 700 lbs. of steam per ton of coal carbonized. If that were applied to the intermittent retorts of any system, it would practically make up the amount of steam by which the intermittent system was deficient, when compared with the existing continuous retort plants. It was well known that more steam was made on the continuous plant than on the intermittent. He had inspected many intermittent vertical chamber ovens, and had been impressed by the shortness of time required for discharging and charging. The average time was about 2½ minutes from the opening to the closing of the chamber. Scurfing was very simple, because all that was necessary was merely to open the top and bottom as far as was thought necessary for purposes of draught, and let the graphite burn out.

The Author's Reply.

Mr. BOWATER confined his reply to the discussion to one or two points that had been raised which, if not dealt with immediately, might, he said, give rise to misunderstanding. He promised to reply fully in writing to the other points. With regard to his reference to the limitations of verticals, mentioned by Mr. Roberts, he said it was well known that they would carbonize any kind of coal; and his remarks as to their limitations had reference only to the conditions under which that carbonization took place. If an excessive amount of rodding were necessary, or other adverse conditions arose, due to the difficulty of carbonizing, then he would say that they had limitations; but all coals, no doubt, could be put through continuous verticals. With regard to the statement that one ton of coal was carbonized per day per 20 sq. ft. of ground space occupied, with intermittent vertical chambers, he said that the 20 sq. ft. was the area of the bench only. It was impossible to give a figure to cover everything, because the methods of coal and coke handling, and the bye-product plant, varied from design to design, and they might occupy more or less space in different plants, so that naturally he had limited his reference to the actual carbonizing bench. He was unable to give the dimensions of the various ovens off-hand, but the 7·5 ton oven referred to by Mr. Roberts had a carbonizing period of 24 hours, so that the charge was thicker than in the ordinary 12 or 16 hour oven. He agreed with Mr. Roberts that the coke figure in Table II. should have been 13·48, so that some of Mr. Roberts' questions needed to be modified. The reason why he had referred to the waste heat recovery "possible" from flue gas and from dry cooling of coke, in Table I., instead of giving actual figures, was that there was no waste heat boiler on the setting, and the waste heat was not recovered. At 650° C., with the fuel consumption given, approximately 700 lbs. of steam per ton carbonized would be available from the flue gas. This also applied to the coke.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

(AUXILIARY SECTION MEETING.)

The Sixteenth Half-Yearly Auxiliary Meeting of the North of England Gas Managers' Association was held on Saturday, Dec. 3, at the offices of the Distribution Department of the Sunderland Gas Company, Hind Street, Sunderland.

Mr. C. F. BARROW (Distribution Superintendent to the Sunderland Gas Company), who presided, welcomed the members on behalf of the Directors, and expressed the regret of his Chief, Mr. Cox, at being unable to attend the meeting. Mr. N. S. Cox, however, hoped they would have an enjoyable and successful gathering.

INSTITUTION EDUCATION SCHEME.

Mr. CHARLES DRU DRURY (Sunderland), Chairman of the District Committee, fully explained the Institution of Gas Engineers' Education Scheme, the spirit of which, he said, was "satisfactory education;" and it was founded on a broader base than the mere capacity to answer questions. It provided no short cuts to advancement; and in issued certificates there was the assurance that the successful students had pursued and profited by an adequate course of study, under qualified direction and tuition in a properly equipped educational establishment or laboratory. From a study of the regulations, it must be obvious to a student that it was a great advantage to him to have matriculated before leaving school; matriculation being one of the qualifications for admission to the diploma examination. It was true that the Education Committee had discretionary powers to remove obstacles from the way of students who had received adequate instruction in ancillary subjects in former years, but were not taking a prescribed course under the scheme, and were now desirous of entering into examination, whether for the ordinary or higher certificates or for the diploma; but exemptions, if carried too far, might tend in effect to penalize those who entered normally into the scheme. As far as their own district was concerned, as yet no classes existed in either gas engineering or gas supply; and therefore all candidates for the next examination, which would be held on Saturday, April 28, 1928, would come under section 2 of the major course, and sit as external students. During the session 1928-9 the District Committee hoped to be able to arrange for a class or classes in at least one or more centres, thus enabling the candidates for examination to sit as internal students; and it must be borne in mind that the Education Committee would not admit external students to examinations if there was any possibility of their becoming internal students. The formation of classes depended in the first instance on the number of potential students; and the District Committee trusted that the younger members of the profession would realize the advantages to be gained by a thorough technical education such as was provided by the scheme, and make an effort, and even a sacrifice, to take such advantages.

The District Committee hoped that the seniors in the profession would make it as easy as possible for the juniors of their staffs to avail themselves of the Education Scheme, and if possible obtain from their Boards of Directors or Gas Committees financial and other assistance for the students. It was suggested that such assistance might take the form of (*a*) reimbursement of a student's class fees, if he satisfied certain conditions as to attendance, &c.; (*b*) the whole or partial payment for his text-books; (*c*) the reimbursement of railway fares where necessary to attend classes out of town; (*d*) some allowance from his working hours when necessary to enable the student to attend a class at a distance; and (*e*) provision of an extra weekly copy of the "GAS JOURNAL" or "Gas World." The Directors of his own Company had made concessions to students more or less on the above lines, and had shown every desire to encourage the members of their staff in their efforts to make themselves more useful to the gas industry. For the examinations in 1928 there were two for the Diploma, four for Gas Engineering, and one for Gas Supply. The potential candidates for 1928 were: Gas Engineering, 16; and Gas Supply, 11.

Mr. O. H. INGHAM (South Shields) wished to know if it was essential to pass the matriculation before trying for the Diploma, or was it subject to being waived by the District Committee. He though there were a number of students who were rather dissatisfied with the information that had been given about the subject. The scheme should be made as widely known as possible. The ancillary subjects formed a very wide range; and he knew one or two students who would like to know what the subjects really were.

Mr. DRURY stated that the scheme was still subject to alteration, as H.M. Inspectors were making some recommendations; and the Committee were reluctant to issue any more books until the matter was settled. Matriculation or its equivalent was necessary for the Diploma; but in the case of students over 25 between January, 1927, and June, 1932, it would be waived by the Committee, provided the candidate showed he had had the necessary instruction in the subjects. After 1932 matriculation would be insisted upon. The Examiners would give sympathetic consideration to all candidates. They were not there for the purpose of knocking a man down.

Mr. W. E. OULD (Tynemouth) proposed a vote of thanks to Mr. Drury; and Mr. L. M. WELDON (West Hartlepool), seconding, said that if the ancillary subjects were set out in some printed form, it would be an advantage.

The resolution was carried; and Mr. DRURY, in reply, stated that what Mr. Weldon had asked for was in the book dealing with the scheme, although there had been so many alterations that many of the editions were of no use. The District Committee wished them to do their best to get the Directors or Committees sympathetic to the students; and he felt sure they would do so.

GAS v. ELECTRICITY.

Address by the Chairman, Mr. C. F. BARROW, Distribution Superintendent to the Sunderland Gas Company.

It gives me great pleasure to take over the reins of office as your Chairman at the close of a year which has been practically free from strikes and labour troubles, and at a time when there are signs of an improvement in trade. Despite the launching of the Government Electricity Scheme, I have sufficient confidence to predict a very busy and prosperous year for the gas industry in 1928.

I am pleased my official position does not carry with it any very onerous duties, thanks to our energetic Secretary, who has so willingly carried out the duties as such since the inauguration of these meetings, and has shouldered most of the responsibility of making our gatherings a success. You will notice that these functions are growing in popularity; and I think this is due to the excellent papers which have been given, and the free, interesting, and beneficial discussions which have ensued. To-day we have endeavoured to make your visit to Sunderland pleasant, interesting, and instructive, and have arranged for our distribution department and showrooms to be open for your inspection.

In selecting my subject, I have been influenced by recent events in Sunderland, and the great publicity which is being given in the Press to the Government Scheme for extending the use of electricity. Therefore, I should like to occupy the time at my disposal in talking to you on the subject of Gas *v.* Electricity.

We are told that a cheap and reliable supply of light, power, and heat is essential for the industries in this country. Gas is already supplying this need, and has been doing so for many years. Therefore, what need is there for the Government to finance the Electricity Scheme, and why should paid Government officials go round the country making extravagant statements and raising hopes which may never be realized? No industry should be favoured in this way, particularly the electricity undertakings, as most of these concerns are in a sound financial position and do not require Government support.

We, as gas men, know that on its merits the gas industry has developed, unaided, to the huge organization it is to-day. We also know the great and noble part it played in the Great War and the recent coal strike. By the increasing use of gas, the Nation's most valuable asset, coal, is being used in the most economical way, and the smoke abatement problem is being brought nearer to its solution.

THE LIGHTING LOAD.

Gas is still holding its own in cooking and heating, for both domestic and industrial purposes. Therefore, I wish to say a few words about lighting in particular, for I am afraid that, in looking after the larger issues, the lighting load has been somewhat neglected by some companies, and no great effort made to retain it. Perhaps it will interest you to know what has been done in Sunderland to meet the keen competition in this respect.

Locally, electricity is supplied by the Borough Electricity Undertaking, and the rural areas are supplied by the Newcastle-upon-Tyne Electric Supply Company, Ltd. Therefore, our opposition consists of one municipal and one private undertaking.

In February, 1926, our competitors launched what seemed to be a very attractive scheme, which was intended to appeal particularly to our slot consumers. The local Press announced "that, as cables have now been laid in almost all parts of the town, electricity will be within the reach of all." This statement sounds all right, but they evidently overlooked the main factor, the question of price; for there are cables which have been laid for twenty years in some localities, where a very small percentage of our consumers have adopted electricity for lighting.

The new scheme was called the "Continuous Hire Scheme," under which installations complete with an electric iron were

THE DISPLAY DURING HEALTH WEEK.

carried out free of initial cost in houses from three to six rooms. The weekly hire rentals were as follows:

Size of House.	For the Two Summer Quarters.	For the Two Winter Quarters.
3 rooms	1s. 6d. per week	1s. 6d. per week
4 ,,	1s. 6d. ,,	2s. 0d. ,,
5 ,,	1s. 6d. ,,	2s. 6d. ,,
6 ,,	1s. 6d. ,,	3s. 0d. ,,

For each sixpence of weekly rental, one unit of electricity is allowed, and all electricity used in excess of this is charged at the low rate of ¾d. per unit.

Alternative to the weekly rental, a consumer may have a prepayment meter for either a shilling in the slot or a penny in the slot.

With a prepayment meter, all the electricity consumed is charged at 6d. per unit.

This scheme provides free maintenance of the wiring and the electric iron, including lamps.

The continuous hire scheme does not apply to newly-built houses.

I understand that under this scheme 1s. 6d. per week had to be paid whether the minimum amount of electricity was consumed or not. Therefore, supposing 3 units were sufficient to meet the requirements for lighting a three-roomed cottage, the consumer was committed to pay the sum of 19s. 6d. per quarter. In comparison with this, we instal a slot gas meter, three fittings, and a cooker, free of cost; the consumers paying only for the amount of gas used, at 2s. 8d. per 1000 c.ft., *plus* the usual extra charge to slot consumers. The average cost to our slot consumers for lighting only is 8s. 6d. per quarter. I will not trouble you with more comparative costs, as these have been very frequently published and can be obtained, together with other useful information, from the "B.C.G.A."

To further their scheme, the Corporation enlisted the assistance of the local electrical contractors, who were promised the work of fitting the installations where they secured the orders. Consequently eight contractors sent out canvassers on commission only, which meant—no orders, no pay. In many cases where orders had been obtained by this method, their customers returned to gas after using electricity a few weeks. In anticipation of this scheme coming into operation, we started our counter-campaign. A certain plan of action was decided upon; and our canvassing staff was well organized and augmented.

A Campaign in Sunderland.

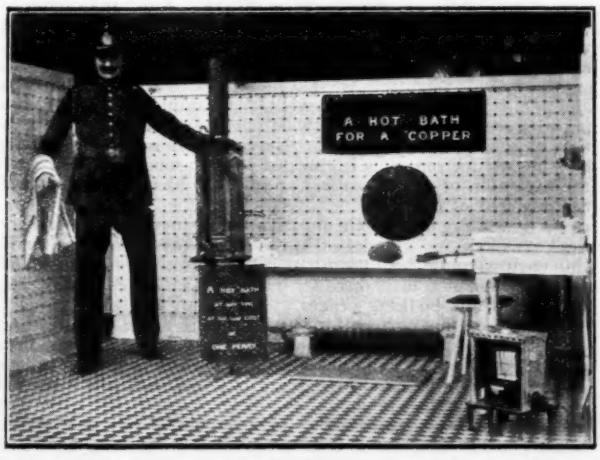
First one of our responsible officials visited all the local house agents and property owners, and pointed out that the present time was not opportune to encourage poor people further to increase their liabilities by adopting a more expensive form of lighting, especially when, owing to the strike and trade depression, many were unable to pay their rent.

A number of our canvassers were sent into districts to follow in the wake of the electricity canvassers.

When they came across anyone who had signed an electricity agreement, they put the case for gas clearly, and emphasized the fact that gas was not only cheaper, but was more suitable to their needs. Some of our canvassers succeeded in cancelling as many as twenty agreements per day.

To keep our slot consumers satisfied, it was decided to offer them a good British inverted burner at a reasonable price, and allow them to pay for same out of the rebate when the meters were collected. Inquiries for samples and prices were sent out; and on receipt of the burners these were tested, a well-known make was chosen, and a large order placed. It was decided to increase our slot collecting staff in preference to engaging a special staff of salesmen to dispose of the burners. As the collector had the right of entry into the premises, it would be much easier to induce a sale by this method. The scheme was an immediate success; orders for 123 burners being received on the first day. By further increasing the number of collectors to twenty, the daily sales amounted to 600. The orders came in so rapidly that an augmented staff of maintenance fitters and senior apprentices had to be engaged to execute same. During

A Smoke Abatement Display.



Geyser Propaganda.

the busiest period, 3000 burners were sold per week; and, up to date, over 30,000 burners have been fixed.

After achieving such a remarkable result among our slot consumers, it was decided to extend operations to our ordinary consumers. Our meter inspectors succeeded in disposing of 3800 in a few weeks, and orders for 200 per week are still coming in. Considering that our total number of consumers is 49,278—27,533 being ordinary and 21,745 being slot—the result has been most gratifying. In fact, it has cleared many of the electricity canvassers off the road, for now they find our consumers so well satisfied that very few orders are to be obtained for their commodity.

The success achieved in this effort reflects great credit on our staff, for all entered into the spirit of the scheme with promptness, energy, and enthusiasm. I should also like to add a word of praise for the burner makers, who played a large part in the success of our campaign by supplying us with an excellent burner at a cheap price, and never once letting us down for deliveries. Sometimes, indeed, they sent on quantities of 50 gross at a time.

Having secured the local market for burners and mantles, and being desirous of retaining same, we are giving the local tradesmen—such as ironmongers, general dealers, &c.—the opportunity of becoming our agents. The following is a copy of the circular letter addressed to each:

Date.....

Dear Sir,

In order to ensure our consumers obtaining a good British burner and mantle, we are prepared to supply these to you at a reasonable cost, so that you may retail same and eliminate the cheap foreign burner and mantle.

Our representative will call shortly to discuss the proposition with you, when he will place before you terms which will be to our mutual advantage.

Yours faithfully,

Showcards have also been supplied for window and counter display purposes. This effort has resulted in the sale of 57 gross of mantles in three weeks; and this number has been sold in quantities varying from three dozen to 1 gross to 180 shopkeepers.

In addition to our successful operations already mentioned, many shopkeepers, publicans, and others have been induced to return to gas, mainly on the question of cost, of which the following is a typical example:

On March 27, 1926, a large miners' welfare centre was erected by a local colliery company, who, on being approached, stated they did not require gas for any purpose, as electricity was being installed for lighting, and coal was being used for the central heating system. After the premises had been open twelve months, it was ascertained that the Committee were very much alarmed and dissatisfied with the cost of electricity. The Secretary was interviewed, and informed that gas would be much more economical. He consented to an estimate being given for the installation of gas, together with the approximate consumption. This was submitted and placed before his Committee, who decided favourably for gas. The work was duly carried out, and gas lighting brought into use on May 11, with a highly satisfactory result.

SERVICE.

It is only in comparatively recent years that the service rendered by the gas industry has become more prominent; and the public have been more enlightened on its great possibilities, thanks to the splendid propaganda work of the "B.C.G.A.," the excellent reports in the Technical Press, and the local advertising of the individual companies. For many years the Sunderland Gas Company has endeavoured to give a good service of cheap gas, reliable in quality and of even pressure.

The needs of consumers have been well attended to by a competent staff of maintenance fitters. Our maintenance scheme has been in vogue for 26 years. At present there are 35 men engaged; and this number is frequently being augmented. We endeavour to give our household lighting consumers one visit monthly, shopkeepers fortnightly, and churches and public institutions weekly visits. Cooking and heating apparatus are inspected about twice per year, and special attention is given when requested. No charge is made for labour, but the cost for renewals is charged at a reasonable figure, with the exception of rental cookers and fires, which are maintained entirely free of cost.

By a well-organized scheme of maintenance, consumers are kept satisfied, and any defect in the apparatus is remedied; and this ensures same being kept in regular use. It is also found that maintenance men discover many opportunities of advising consumers and booking orders.

It has been our custom for fourteen years to fix gas fires and cookers free, up to 30 ft. of piping. While cookers and fires can be obtained at a nominal rental, a cash or hire-purchase sale is always attempted first, for it is found that where several pieces of apparatus, including the meter, are on rental, the gas account is thereby increased. This is pointed out to the consumer, with the result that many sales are effected. The rental system has undoubtedly helped considerably to popularize fires and cookers; for when consumers have found same to be satisfactory, they have eventually become purchasers. In fact, at present, 50 p.ct. of our orders are sales.

Therefore, the maintenance and rental systems prove to be a great success in attracting business, increasing consumption, and eventually decreasing the price of gas; thus bringing the greatest benefit to the greatest number.

SHOWROOM WINDOW DISPLAYS.

There has been considerable controversy about showroom window displays, some claiming that stunt displays are best, others giving their verdict for an array of apparatus tastefully arranged with the rental, sale, or hire-purchase price marked in plain figures. We believe in both. Having a large frontage of 80 ft. divided into six sections at the corner of one of the main streets, something more than an ordinary display of gas apparatus is necessary to attract attention. A special show setting-out the utility of the article we are selling adds freshness to our displays. The latter take the form of something topical or seasonable, and are changed about once per month. The following are a few examples conceived and executed by our own staff: A lighting display, the evolution of cooking, smoke abatement, "Health Week," gas fire display, geyser display, sulphate of ammonia display, and residual display.

You will no doubt pardon my introducing a personal note, but I should like to express the pleasure it has been to serve under a Board of Directors and a Chief who have always believed in a very progressive policy. They are ever ready to listen to suggestions from any member of the staff; and, if the ideas are good, no time is lost in putting them into operation.

I will conclude with an old quotation, slightly altered:

> "There is a tide in the affairs of *an industry*,
> Which, taken at the flood, leads on to fortune."

Therefore, gentlemen, let us not be lulled into inactivity by talk of friendly competition and the assertion that there is room for both gas and electricity. Let us devote all our skill, energy, and enthusiasm to furthering the interests of the undertaking we have the honour to serve.

Mr. BATT (Newcastle) proposed a vote of thanks to Mr. Barrow for his address; remarking that they would have to be very careful about their electrical competitors. Electricity had wakened them up; and gas had worked for its present position. Healthy competition, he thought, brought out the best that was in them.

Mr. F. P. FALL (Sunderland) seconded.

Mr. BARROW, in reply, said his Company would be pleased to help any other gas undertaking in regard to matters he had dealt with in the address.

The date and place of the next meeting were left to the Committee.

Subsequently the company inspected the workshops at Hind Street, and the showrooms in Fawcett Street, of the Sunderland Gas Company, who entertained them to tea.

LECTURES TO SMOKE INSPECTORS.

The programme was reproduced on p. 273 of the "JOURNAL" for Oct. 26 of a series of lectures and demonstrations to assist candidates in the examination to qualify them for the post of smoke inspector. The lectures extend from Nov. 4 to Dec. 5; and brief abstracts of some of the earlier ones have already appeared—pp. 469, 522, 624.

SMOKE PREVENTION.

By Dr. J. S. OWENS.

This lecture dealt with the methods of smoke prevention in different furnaces. The effect of cooling the combustion chamber, and of too great or too small a supply of air, was explained, and the bearing upon the formation of smoke. The fact that a boiler furnace consumes fuel continuously, but is often fed intermittently, was pointed out, to emphasize the value of mechanical stoking as a smoke preventing measure. By mechanical stoking a continuous feed is provided; while the need for opening the furnace door, with the accompanying excess air admission and cooling, is done away with.

The problem of smoke measurement was dealt with, and various charts used for this purpose were shown on the screen, as well as an instrumental method for the same purpose. Some interesting photographs of dust from different furnaces were shown.

Peebles Automatic Station Governors.—On p. 641 of the "JOURNAL" for Nov. 30 there appeared an advertisement of the patent automatic self-loading station gas governor manufactured by Messrs. Peebles & Co., Ltd., Tay Works, Bonnington, Edinburgh. In the description, there was an error. It was stated that, "as the governor opens, so the rolling weight, acting through the lever carrying the curved rail, gradually runs across, actually loading the governor to a higher pressure, and *vice versa*, without hurting or overloading." "Hurting" should, of course, have been "hunting."

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

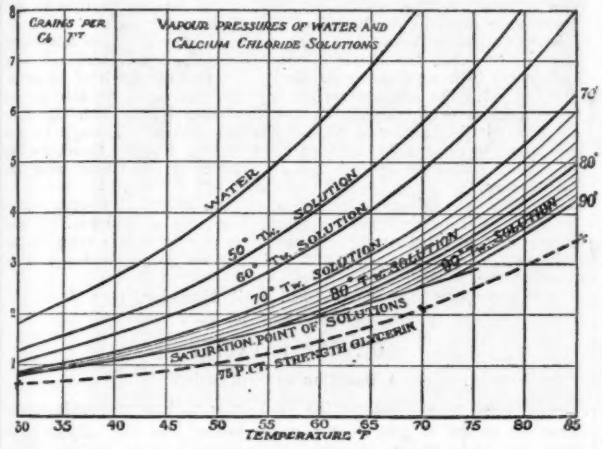
Gas Drying.

SIR,—We read with interest the paper by Mr. C. Harris, of Taunton, on gas drying, but at the same time cannot help making a criticism of some of the assumptions which are included. Mr. Harris remarks lightly upon, and passes over, in the space of a few lines, the fact that glycerine has been proposed for gas drying, and infers that it has been applied not really to much purpose.

It would perhaps interest Mr. Harris to know that glycerine has been proposed, and, moreover, tested, and shown to be a decided commercial proposition, showing advantages even over $CaCl_2$ solution for this purpose, and that at the present time a process using glycerine for gas drying is being placed on the market by us.

Mr. Harris states that 86 p.ct. glycerine must be used to have the same vapour pressure as concentrated $CaCl_2$ solution; but as he does not state the temperature of the $CaCl_2$ concentration, one cannot deduce anything regarding the vapour pressure of either liquid.

Below, inserted in the graph taken from Mr. Harris's paper, we have placed the vapour-pressure curve for a 75 p.ct. concentration of glycerine. The figures on which this curve is based do not appear to support his assumptions.



Further, it should be of general interest to know that glycerine is not dependent, as are salt solutions, on vapour pressure for its drying powers, but on its affinity actually to absorb the water, forming hydrates in a manner analogous to the way in which anhydrous salts combine with water to form crystalline hydrates.

Referring to the loss on vaporization, it is generally known that glycerine of considerably over 80 p.ct. concentration can be concentrated with negligible loss at temperatures varying from 80° to 100° C., under a vacuum of 20 in.; and in such circumstances the initial cost of glycerine remains far from a material consideration.

Per pro KIRKHAM, HULETT, & CHANDLER, LTD.,
A. F. H. KNOWLES.

37-38, *Norfolk House,*
Norfolk Street, Strand, W.C.
Nov. 30, 1927.

Explosions.

SIR,—In connection with your correspondent "Civil Engineer's" reference, in his letter in the last issue of the "JOURNAL," p. 652, to blowing out of mains, the best practice undoubtedly is:

(*a*) Where there is considerable difference in level between the two ends of the main, to blow out from the lower end by introducing gas at the higher end. In this way the gas gradually displaces the air downwards, while itself progressively occupying the main from the upper portion.

(*b*) Where the main is more or less on a level, the blow-out should still be from the lower end of the main, but the blow-out pipe should be carried down through the main to within two or three inches of the bottom of the pipe, so that the gas introduced may gradually occupy the upper portion of the cross-sectional area of the pipe as the air is displaced from the lower.

In both cases the gas is connected to the upper portion, while the air is displaced from the lower portion of the main, and the difference in specific gravity of gas and air is taken into consideration.

WALTER HOLE.

Wharfedale, Barton,
Torquay,
Dec. 5, 1927.

A Vacuum Apparatus for Clearing Gas Pipes.

SIR,—In your issue for Nov. 30, you published a notice, received from Duisburg, Germany, of a vacuum apparatus termed the "Hercules," for removing obstructions in gas pipes, &c. Such an apparatus is quite old, and was used by myself years ago. I sent one from Copenhagen (where it was made) to my friend Dr. Carpenter at the South Metropolitan Gas Company. It worked quite well; and his only objection, as far as my memory goes, was that it frightened the horses! The lid of the tank, in flapping back under the sudden vacuum, certainly makes a slight bang; but it will not frighten motor cars.

The contraption was so fascinating that I tried one at home to remove the dust from the flues of a coke stove; but at the first explosion the domestic cat vanished through a pane of glass, and in consequence the home authorities viewed the machine with great displeasure. It certainly was the forerunner of the modern vacuum cleaner.

F. D. MARSHALL.

19, *Queen Anne's Chambers, S.W.,*
Dec. 3, 1927.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

East Hull (No. 2), Newhaven, Neyland, and Wokingham Gas Orders: Referred to the Special Orders Committee.

Bristol, Chelmsford, and Harrogate Gas Orders: Approved.

Special Orders.

The Special Orders Committee reported, on Nov. 29, that no petition had been presented against the Bristol, Chelmsford, and Harrogate Gas Orders, and that there was nothing in them to which they thought it necessary to call the attention of the House.

HOUSE OF COMMONS.

Progress of Bills.

East Hull, Newhaven, and Wokingham Gas Orders: Copies presented.

Bristol, Chelmsford, and Harrogate Gas Orders: Approved.

Lighting of the Houses of Parliament.

On Thursday of last week two questions were asked arising out of the failure of the electric light in the House on Nov. 24.

Mr. CLAYTON asked the Under-Secretary of State for the Home Department, as representing the First Commissioner of Works, whether, in view of the unreliability of electric lighting, he would consider the desirability of installing gas lighting in the Houses of Parliament to ensure a reliable source of light.

Sir H. BRITTAIN asked whether, after the inconvenience inflicted on the House on Nov. 24 owing to the failure of the electric light, immediate steps would be taken to provide that a second circuit should be available in future.

Sir V. HENDERSON (replying for the First Commissioner of Works) stated that the inconvenience caused to the House by the failure of the electric light on that day was regretted. This was due to the fusing of the main cable at the power station of the Supply Company, as the result of a fire in an adjoining hut. In normal circumstances, an alternative source of supply would have been available, but, unfortunately, the gear for switching-over was not in operation, owing to alterations which were in progress in connection with the linking-up of various London stations. For the same reason, the power station itself was without light, and the change-over had to be effected by hand in the darkness, which accounted for the delay. The advisability of installing an independent stand-by generating set in the Houses of Parliament was considered two years ago, but, apart from the need for economy, the assurances given by the Electricity Company convinced the First Commissioner of Works that such an installation was unnecessary. He could assure the House that when once the stations were linked up, a complete failure of the supply would be practically impossible. In the meantime, every possible step would be taken to prevent a recurrence of the trouble. To instal gas would not only be extremely expensive, but would not meet the requirements of the case, as electricity was necessary both for the ventilation of the Houses and for smoke extraction.

Bergius Process.

Mr. HARDIE asked the President of the Board of Education, on Dec. 1, whether he could state what progress had been made since May last by the Bergius process for the extraction of oil from coal.

Lord E. PERCY replied that work on the Bergius process had continued steadily at the Fuel Research Station, and the results confirmed that large quantities of liquid fuels could be obtained from coal by this process. A beginning had been made in the investigation of the whole question of the action of hydrogen on coal under different conditions, and interesting results were being gradually accumulated. There could be no doubt about the interest and importance of the process; but it was no part of the duties of the Department to offer opinions on the purely commercial aspects of the inventions which it made or investigated.

Mr. HARDIE: Why has the Department gone so far out of its way to investigate a German system—though I do not disagree with that

—when English systems have been left without aid in the matter of investigation?

Lord E. PERCY said that Mr. Hardie must not assume that to be the case.

Lieut.-Commander KENWORTHY asked if it was not obvious to Lord Percy that these results were not being taken any notice of by the commercial interests involved.

Lord E. PERCY stated that he did not think it was obvious at all.

Commander WILLIAMS desired to know if there was any communication between the Board of Education and the Board of Trade with a view to advertising and making known the results of these inquiries.

Lord E. PERCY replied that they were not in his Department. The Department of Industrial Research was under the Lord President of the Council. As to advertising, it would be realized that it was important that the Government should not in any way commit themselves to an opinion as to the commercial possibilities of any process of this kind.

LEGAL INTELLIGENCE.

CHALK FUEL, POWER GAS, AND BYE-PRODUCTS CORPORATION.

Summonses for Alleged Fraud.—Wednesday, Nov. 30.

The hearing of the summonses against Sir Charles Herne-Soame, Bart., Robert George Harley, and Lieut.-Col. Edmund Octavius Eaton, in connection with the activities of the Chalk Fuel, Power Gas, and Bye-Products Corporation, was continued at the Mansion House Police Court, London, before Alderman Sir GEORGE TRUSCOTT.

It was alleged that the defendants had conspired to obtain money by falsely pretending that certain reports appearing in the prospectuses and pamphlets issued by the Corporation, with regard to a fuel consisting largely of chalk, were true and genuine reports. It was stated by the prosecution that laudatory reports had been published by the Corporation concerning the properties of the fuel, over the name of an engineer who had tested it and had reported adversely upon it. (The previous proceedings have been reported in the "JOURNAL" for Nov. 9, p. 398, and Nov. 23, p. 559.)

Mr. *G. H. Franklin* (Mechanical Engineer), who tested the chalk fuel in 1914, both in stationary boilers and in a railway locomotive, and reported adversely upon it, was cross-examined by Mr. J. P. VALETTA (Counsel for the defence).

It was suggested by Counsel that in May, 1914, witness had made two tests of the chalk fuel in stationary boilers. In the first case the fuel was given to him to test quite informally; but in the second case different material was sent to him, and was found to be satisfactory. He did not dispute, he said, that one test was unsatisfactory. Witness, however, said he had tested the fuel in stationary boilers on only one occasion. It was tried in a vertical boiler and a water-tube boiler, but was found to be unsatisfactory. Thereupon, Counsel produced a reprint of an extract from an article published in the "West London Observer" on May 22, 1914, headed "Coal from Chalk." In this article reference was made to a very interesting and exhaustive test of the fuel, carried out at one of the principal local factories, by Councillor G. H. Franklin (Mr. Franklin was at that time a member of the Fulham Borough Council), on behalf of Suddine Patent Fuel, Ltd. (the parent Company of the Chalk Fuel Corporation). The test was said to have been attended by a deputation headed by Sir Charles Herne-Soame, Bart. (Chairman of the Syndicate), and including Col. the Hon. H. V. Duncombe, D.S.O. (Vice-Chairman, and the son of the Earl of Faversham), Col. Sir William Foster, Bart., Mr. F. J. Samuels, Mr. J. D. Aysh (Messrs. Aysh, Nye, & Co.), Dr. Greenfield, and Mr. Hollis. The test was made first, it was stated, in the furnace of the vertical tubular boiler, and, secondly, in the furnace of a Babcock & Willcox water-tube boiler, fitted with mechanical stokers; and the results were satisfactory. Similar tests were said to have been made in various parts of the country, and in every case the fuel appeared to be satisfactory. Councillor Franklin was reported to have said:

> As an expert engineer on fuels, and being in a position to judge, by the practical experience I have had day by day of the consumption of over 15,000 tons of coal per annum, I have no hesitation whatever in recommending this Suddine fuel as being cleaner and far more economical than the pit coal. It will be a great boon to the householder in the winter months, both on account of the lowness of its price and its lasting and uniform qualities; and I have only to add that, with proper supervision in its manufacture, rapid strides would be made, for I feel convinced that 1 ton of Suddine fuel is equal to 30 cwt. of ordinary pit coal.

Witness, replying to Mr. Valetta, said that to his knowledge he had not seen the article until it was shown to him by the police about a year ago. He might have seen it before, but did not remember having done so; neither could he remember any of the Councillors at Fulham having brought it to his notice. The Council were not interested in the matter. The majority of the names mentioned in the article he had never heard of. He had made only one test of the fuel in May, 1914, and there was no distinguished gathering there. He had not made a test prior to that.

Questions were put by Counsel to ascertain whether witness had been interested in tests carried out by others. He mentioned that tests had been made by a Mr. Horsnell and a Mr. Leslie, both of whom were known personally to witness. Witness said he knew that Mr. Horsnell had tested the fuel, by arrangement with Mr. Hollis (Secretary of Suddine, Ltd.); but it had failed. While he admitted having introduced Mr. Horsnell to Mr. Hollis as the result of a casual meeting, it was not for the purpose of testing the fuel. Neither had he introduced the fuel to Mr. Leslie. He could not recall having interested himself in anyone else who might have made tests.

With regard to the test he had carried out on the locomotive, witness said the fuel consisted not of briquettes only, but of two kinds mixed together. There was excess of ash, which interfered with the draught. He agreed that if the tar content of the fuel were increased 5 p.ct., the calorific value would be increased appreciably.

Witness denied that in 1914 he had contemplated serving on the Board of Suddine, Ltd., and that the outbreak of war had prevented his taking that position. His tests of the position showed that its calorific value was too low, and that it produced too much smoke. His reports were handed to Mr. Hollis; and he agreed that he had never seen them in the hands of Col. Eaton.

Re-examined, witness said he had not inspired, written, or authorized anybody to write, the article in the "West London Observer." The statements in it were not true. Indeed, it was the work of an artist. Dealing with the test carried out by Mr. Horsnell, he said he did not think there had been difficulty in raising steam with the fuel; he believed the fault was that it was too smoky. Though he had not seen the reports on his own tests in Col. Eaton's hand, he had told Col. Eaton personally that the results of the tests were unsatisfactory.

Evidence was given on behalf of a firm of printers with regard to the receipt of orders for printing from the defendants. It was stated that a substantial amount of money is still owing to the printers. They had taken action and obtained judgment, but had not received the money.

The proceedings were adjourned until Thursday, Dec. 8.

GEYSER FATALITY.

A Question of Ventilation.

The death of a waiter in his bath from carbon monoxide arising from an escape of gas from a water heater was the subject of an action heard by Mr. Justice SWIFT and a common jury in the King's Bench Division on Monday, Nov. 28. The widow of the deceased man, Mrs. Marion Woodard, of Pope's Road, Brixton, was the plaintiff, suing under Lord Campbell's Act on behalf of herself and her three children; and she claimed damages from the Corporation of Lambeth, as owners of the house in St. Cloud's Road, West Norwood, where she and her husband lived at the time of the tragedy. She alleged that her husband's death was due to negligence or breach of contract on the part of the defendant Corporation as to the manner in which a gas water heater was installed in the bathroom; there being, she stated, insufficient ventilation in the room.

Mr. DOUGHY, K.C., appearing for the plaintiff, explained that Mrs. Woodard and her children were away for a holiday in June of last year; her husband being left at home to carry on his work. On June 3 he informed a neighbour that he was going to have a bath. Three days later his dead body was found in the bath. The gas was turned off, the water was cold, and there was no smell of gas. The door of the room and the window were closed. The bathroom was small, and so overlooked that it was necessary to shut the window before entering the bath. It seemed certain that, because of lack of ventilation and because the backdraught down the heater threw carbon monoxide into the room, the unfortunate man was asphyxiated. The barking of Mr. Woodard's dog gave the neighbours the alarm, and led to the tragic discovery.

Mrs. *Woodard*, in her evidence, stated that her husband earned about £5 a week. She was left with three children aged 14, 7, and 4 years old respectively.

The action was settled; the Corporation, though not accepting liability, agreeing to pay Mrs. Woodard £900 in respect of the three children, and £100 for herself, with costs.

Mr. Justice SWIFT observed that the plaintiff had certain difficulties to overcome before she could win her action, and she was well advised to accept the sum offered. The Corporation had acted with great propriety in the matter.

A Question of Income-Tax.

Before Mr. Justice Rowlatt, sitting in the King's Bench Division as a Revenue Judge, the South Metropolitan Gas Company appealed against a decision of the Commissioners of Income-Tax, who had refused to allow the appellants to deduct, when computing their profits for the purposes of taxation, a sum of £7217 in respect of the replacement of one of their collier steamships by a better type of vessel. The sole point for decision was whether the old steamer had become "obsolete," thus entitling the Company to the disallowance claimed, that was the difference between the value of the old ship and the cost of replacement. For the Crown, the Solicitor-General submitted that if the old ship was less convenient for the purposes for which it had been acquired—viz., the carrying of coal from Newcastle to the Company's wharf—it had not become obsolete within the meaning of the Income-Tax Rules. His Lordship said he could not interfere with the decision of the Income-Tax Commissioners on a question that was one of fact and degree.

MISCELLANEOUS NEWS.

GAS EXHIBITION AT DUNDEE.

The Dundee Town Council were wisely guided by their Gas Committee, of which Councillor A. A. Leslie is the Convener, in promoting at the present juncture a gas exhibition on a popular and attractive scale. It is an effort altogether worthy of the Department. No more opportune time could have been selected for such a venture, for the citizens of Dundee at the moment are interested in the conspicuous success of the city's school children in the Fairy Gas Competition promoted by the British Commercial Gas Association. The fact that a prize scholarship for £50 has been won by a pupil of Morgan Academy, Dundee, and that scholars in the same Academy, as well as pupils from many other schools in the city and suburbs, have emerged as prize-winners, has stimulated interest in gas manufacture. As a matter of fact, 36 prizes, including the scholarship already referred to, have been Dundee's reward for an entry of 325 in the Competition.

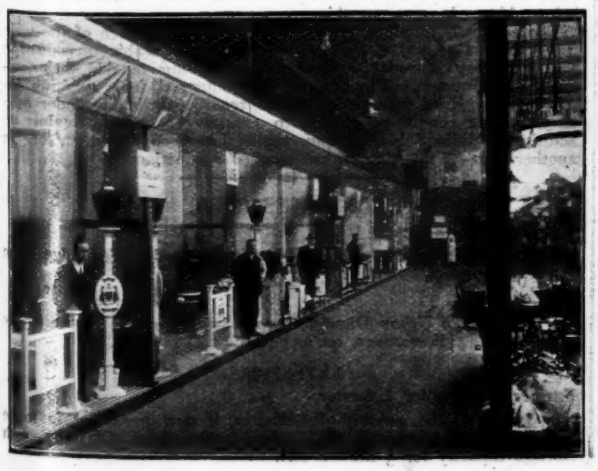
The promoters were wise, too, in their choice of a setting for the exhibition, because the Drill Hall in Bell Street, Dundee, is admirably adapted for such a display. Musical programmes were given daily by the band of the Training Ship "Mars," by the band of the Baldovan Industrial School, and by Carmichael's Orchestra; and there were cookery demonstrations by Miss E. M. Dods, M.C.A. Mr. W. M. Mason, Manager of the "B.C.G.A.," and others extolled the virtues of gas by the medium of lectures or addresses. Mr. Mason gave a fascinating lecture (illustrated by lantern views) on "A Century of Service."

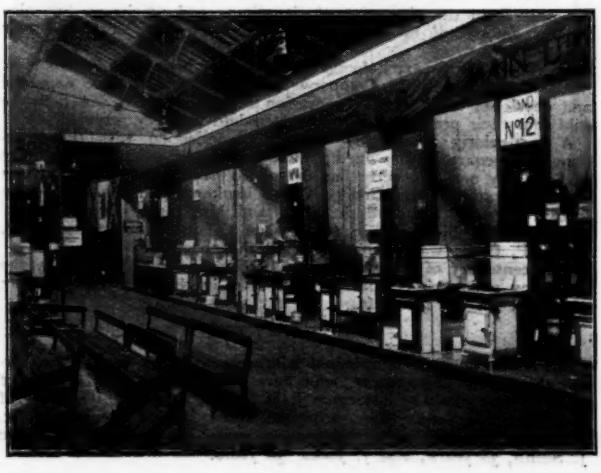
The exhibition was opened on Monday, Nov. 28, and will be continued until Saturday of the present week (Dec. 10). The venture has already exceeded the expectations of even the most sanguine of its promoters. The attendances have been exceptionally large.

The following firms have exhibits: Wholesale Fittings Company, Ltd., Manchester; George Bray & Co., Leeds; Falk, Stadelmann, & Co., Ltd., Glasgow; Fletcher, Russell, & Co., Ltd., Warrington; the Davis Gas Stove Company, Ltd., London; the Parkinson Stove Company, Ltd., Birmingham; the Forth and Clyde and Sunnyside Iron Company, Ltd., Falkirk; the Dundee Corporation Gas Department (in the completion and lay-out of whose stands were associated James Keith Blackman Company, Ltd., London; British Furnaces, Ltd., Chesterfield; Alder and Mackay, Ltd., Edinburgh; the National Gas Engine Company, Ltd., Aston-under-Lyne; and Thomas Glover & Co., Ltd., Edinburgh); the Richmond Gas Stove and Meter Company, Ltd., London; John Wright & Co., Ltd., Birmingham; R. & A. Main, Ltd., Falkirk; the Carron Company, Falkirk; Wilsons and Mathiesons, Leeds; the Falkirk Iron Company, Ltd., Falkirk; William Sugg & Co., Ltd., London; J. R. Ingram, Dundee; and Methven Simpson, Ltd., Dundee.

One of the noteworthy features of the exhibition was the presentation by Miss Winifred High of the prizes won by the girls and boys of Dundee in the Fairy Gas Competition.

On the success of the exhibition, Mr. James Dickson, Gas Engineer and Manager, Dundee, and his Convener, Councillor Leslie, are to be congratulated, as also are Messrs. Hislop (Assistant Engineer), R. S. Johnston (Commercial Assistant), R. J. Herald (Maintenance Department), and Robert Ireland (Stoves and Meters Department).





INDUSTRIAL RESEARCH.

Establishment of Research Council.

In order to provide a co-ordinated body for determining the lines of general industrial research, Imperial Chemical Industries, Ltd., have established a Research Council which held its first meeting on Thursday last. The Council was presided over by Sir Alfred Mond, Chairman of the Company; and the other members were Dr. G. C. Clayton, M.P., Col. G. P. Pollitt, and Mr. J. Rogers (Directors); Major F. A. Freeth, F.R.S., Dr. E. F. Armstrong, F.R.S., Dr. R. E. Slade, Mr. H. A. Humphrey, and Sir Frederick Keeble, F.R.S., all of whom are associated with Imperial Chemical Industries, Ltd., or its subsidiary companies; Prof. F. G. Donnan, F.R.S. (Professor of General Chemistry, University College, London), Prof. Robert Robinson, F.R.S. (Professor of Organic Chemistry, University of Manchester), Prof. W. A. Bone, F.R.S. (Chief Professor of Chemical Technology, Imperial College of Science), Prof. F. A. Lindemann, F.R.S. (Professor of Experimental Philosophy, Oxford), and Dr. E. K. Rideal (Lecturer in Physical Chemistry, Cambridge). Major A. E. Hodgkin will be Secretary.

The Company has felt that co-ordinated industrial research in Britain has suffered in the past from lack of a sufficiently close association with the academic and scientific worlds. The main function of the Research Council will be advisory, and it will act as a clearing house for ideas. Steps have also been taken for following up in the most energetic manner all promising matters which may come before the Council. The Council will provide close *liaison* between industry and the Universities, and will promote both long-distance scientific industrial research and research of the so-called purely academic type.

This is the first body of its kind to be established in this country, though similar organizations have been of great service to both science and industry in other countries. The objective is to place British practice upon more than competitive terms with modern achievements and organizations elsewhere. It is felt that by such means Britain may retain her supremacy among the industrial nations of the world.

CENTENARY OF GAS SUPPLY AT DALKEITH.

[From the "Dalkeith Advertiser" for Dec. 1.]

The fact that 100 years have passed since the introduction of gas lighting to Dalkeith is worthy of at least passing notice by all interested in the history and progress of the old town. Conditions of life have undergone great changes—generally, it is hoped, for the better—in the course of the century, and it is difficult for the present generation to realize what the transition from tallow candles and oil lamps to gas illumination must have meant to Dalkeith citizens of a bygone age. That it must have conduced to a cheerier outlook by providing brighter homes, business premises, and public streets goes almost without saying.

Yet from the earliest records of the Gas Light Company, it is evident that the people of that time regarded the new enterprise with a certain amount of doubt, if not suspicion; and it is interesting to note that for the first ten years of the Company's existence only about half the capital required was subscribed, the remainder being borrowed money.

This, however, is only in keeping with the spirit of caution naturally adopted towards new and unknown undertakings; and is not to be wondered at considering that the gas industry was then only in its infancy. The original subscribers at any rate, if few in number, were men of standing in the business and commercial life of the town; and the subsequent results proved them also to have been men of clear vision, and fully justified their confidence in the ultimate success of the venture.

The history of the Dalkeith Gas Light Company, since its inception, has been one of steady progress, as is shown by the fact that since 1872 the make of gas has grown from about 10 million c.ft. to over 40 millions per annum. This enormous increase is all the more remarkable in view of the advent in more recent years of electricity as an alternative means of power and light. It can be largely accounted for, however, by the ever-growing uses to which gas is applied in the domestic sphere. For heating and cooking purposes it has become a potent competitor with coal. The gas fire, the gas cooker, and the humble ring, which have now come to play an important part in the modern household, commend themselves not only from the viewpoint of cleanliness and efficiency, but also for the amount of drudgery the busy housewife is saved by their adoption.

To cope with the extra demands which they have thus had to face, the Dalkeith Gas Light Company have from time to time extended and developed their plant as occasion required, and it can truly be said that their present works are up-to-date in every respect.

A particularly noteworthy feature in connection with the Company's centenary is that during the whole of its existence the office of Secretary and Treasurer has descended from father to son to the third generation. Mr. George Gray, banker, filled the dual office from 1827 until his death in 1873, and Mr. James Gray, banker, from 1873 till his death in 1903, when the present Secretary, Mr. James P. Gray, was appointed to fill the vacancy.

The centenary of gas supply in Dalkeith has been marked by the Company announcing a further reduction in the price of gas from 5s. to 4s. 2d. per 1000 c.ft.

Presentations of illuminated addresses to employees of the Birmingham Gas Department, who have retired after long periods of service, were made by Alderman J. H. Lloyd, at a recent meeting of the Gas Committee. The recipients were: Messrs. George Black, 34 years' service; Walter Hillyer, 46 years; T. Poulton, 32 years; J. Smith, 38 years; and J. Jones, 38 years.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The market has again been quiet, but on the whole steady for prompt positions, without, however, any expansion in forward business. There has been renewed demand for coking coals in the Durham section, which has raised the price a few pence, and Northumberland steams have been a shade above the worst. The better grades of gas coal are fairly comfortable, and seconds quietly steady. But, generally speaking, the output is being limited by idle time to immediate requirements, so that it would take a very considerably increased trade to effect any material improvement in prices. Costs are, of course, increased by part-time working, and the ascertainments governing December wages, based on October results, again show a serious deficit for both Durham and Northumberland.

Current quotations are 16s. to 16s. 3d. f.o.b. for Wear Special gas, and 15s. 9d. for best qualities. Seconds ask 13s. 6d. to 14s. Durham unscreened coking makes ask 13s. 9d. to 14s. 3d., and the higher figure is reported to have been done, which is the best price for some time. Best bunkers are 14s. 6d. to 15s. 6d., and ordinary qualities freely offered at 13s. 3d. to 13s. 9d. Best Northumberland screened steams are quoted at 14s. direct, and 13s. 6d. through contractors. Gas coke is 24s. to 24s. 6d. f.o.b. for shipment.

YORKSHIRE AND LANCASHIRE.

The continued low prices for steam-raising fuel have not relieved the stocks which collieries have accumulated, and many pits are still working only three days per week.

Gas coal deliveries are moving freely, and outside the contract supplies are to be obtained at low figures.

The export situation does not improve to any material extent, and the coal trade generally is awaiting the details of the scheme now being considered by the coal owners as to the chances of improvement in this direction.

Although there is slight improvement in the demand for house coal, the trade is not satisfactory for the time of the year. Prices remain about on the average summer level.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 16s. 6d. to 16s. 9d.; screened gas coal, 16s. to 17s.; washed trebles, 16s. 9d. to 17s.; washed doubles, 16s. to 16s. 6d.; washed singles, 15s. 6d. to 16s.; washed smalls, 10s. 6d. to 11s.; rough slack, 8s. 3d. to 8s. 6d.; smithy peas, 17s. to 18s. per ton. West Yorkshire—Hartley's (f.o.b. Goole), 14s. 6d. to 15s. 6d.; screened gas coal, 14s. 6d. to 15s. 6d.; washed trebles, 16s. 6d. to 17s.; washed doubles, 15s. 3d. to 15s. 9d.; washed singles, 15s. to 15s. 3d.; washed smalls, 10s. to 10s. 6d.; unwashed trebles, 15s. 3d. to 15s. 9d.; unwashed doubles, 11s. 6d. to 12s.; rough slack, 9s. to 9s. 3d.; coking smalls, 9s. to 9s. 3d. per ton. Derbyshire and Nottinghamshire—Top hards, 16s. to 17s. 9d.; washed doubles, 15s. 6d. to 16s.; washed singles, 15s. 3d. to 15s. 9d.; washed smalls, 10s. to 10s. 6d.; unwashed doubles, 12s. to 12s. 6d.; rough slack, 8s. 3d. to 8s. 6d. per ton. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 14s. 6d. to 15s.; gas coke, 25s. to 25s. 6d.; furnace coke, 16s. 6d. to 17s. 6d. per ton.

The Lancashire market is very quiet, with prices easy. Quotations are: Lancashire best house, 31s. to 32s.; seconds, 25s. to 26s.; common, 19s. to 20s.; kitchen, 24s. to 25s.; Yorkshire best selected, 32s. to 35s.; best house, 29s. to 30s.; seconds, 19s. to 20s.; washed doubles, 13s. to 14s. 6d.; washed singles, 8s. to 9s.; rough slack, 7s. 6d. to 8s. 6d. per ton in wagons at pit.

MIDLANDS.

The only real change in the situation is the steadying of the market for slacks and smalls, the result, of course, of the slackened activity at the pits. Surplus stocks have now been brought within a reasonable compass, so that the market is no longer demoralized by the clearance of spot lots at the best price obtainable. Something like stability has been given to regular market rates. Apart from this there is little alteration in values to note. Nutty slacks make from 6s. to 8s., "D.S." nuts from 11s. to 14s. on an average.

Special concessions which had reduced the list prices of some of the collieries to a nullity are rather less prevalent. Stocks in intermediate hands are, however, still heavy, the only direction in which incipient signs of hardening can be perceived being in the dealers' yards. Most of the pits in Staffordshire, Warwickshire, Derbyshire, Nottinghamshire, and Leicestershire are working from three to four days a week; only a few specially favoured collieries being able to improve on this.

The output is ample to meet current demand in each of the main categories. Gas and electricity undertakings are able to cope with the expanding seasonal demand without going outside their contract commitments. The demand for industrial fuels remains disappointing. Hard furnace cokes are readily obtainable under ordinary trading conditions at 12s. to 14s. at the ovens. Against an additional Midland blast-furnace which has been blown in, one in another part of the district has stopped production.

CONTRACTS OPEN.

Weighbridge.

Weighbridge, new or second-hand, required. [See advert. on p. 701.]

Coal.

The Silsden Urban District Council invite tenders for the supply of gas coal. [See advert. on p. 701.]

EXTENSIONS.

Further Storage for Leicester.

Owing to the growth of Leicester, a new gasholder is to be built on the Aylestone Road Works, at a cost of £111,487, with storage capacity for 5 million c.ft.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 5.

The tar products market continues steady, and values generally are unchanged at the figures last recorded, as follows:

Pitch is about 90s. per ton f.o.b. makers' works; creosote, 9d. per gallon; pure benzole, 1s. 5d. to 1s. 6d. per gallon; pure toluole, about 1s. 10d. to 1s. 11d. per gallon; 95/160 solvent naphtha, 1s. 3d. per gallon; and pyridine, 6s. to 6s. 6d. per gallon.

Tar Products in the Provinces.

Dec. 5.

Markets for tar products remain practically the same.

Pitch is steady, both for prompt and forward delivery. Creosote is firm. White products are unchanged. Refined naphthalene is very firm and prices have advanced.

The average prices of gas-works products during the week were: Gas-works tar, 61s. 6d. to 66s. 6d. Pitch—East Coast, 85s. to 86s. f.o.b. West Coast: Manchester, 80s. to 81s.; Liverpool, 83s. to 83s. 6d.; Clyde, 84s. to 85s. Benzole, 90 p.ct., North, 1s. 1d. to 1s. 2d.; crude, 65 p.ct. at 120° C., 10d. to 10½d., naked at makers' works; 50/90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluole, naked, North, 1s. 4d. to 1s. 5d. nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 9½d. to 10d. Heavy naphtha, North, 10d. to 1s. Creosote, in bulk, North, liquid, 7½d. to 7⅝d.; salty, 7⅜d. to 7½d.; Scotland, 7½d. to 7⅝d. Heavy oils, in bulk, North, 8¾d. to 9½d. Carbolic acid, 60 p.ct., 2s. 4d. to 2s. 5d. prompt. Naphthalene, £13 to £14; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Old Mine-Shaft Causes Explosion.—Investigations into the causes of a violent gas explosion at Leeds early in November, which completely wrecked one house and damaged two others, have shown that the trouble was due to an old mine-shaft, the existence of which was not known. The main which caused the trouble at the wrecked house, No. 1, Trafford Terrace, Harehills, was a cast-iron pipe under the footpath within about a yard of the gable end of the house, laid some twenty years ago over what, as far as the Leeds Gas Department knew, was firm earth. It has transpired now that some distance below the surface was a circular brick-built mine-shaft, long ago out of use. Gradually, with the weight above, the ground subsided and the iron pipe, about 14 ft. long, broke, with the result that there was a steady escape of gas which found its way into the house and was probably ultimately ignited by the sitting-room fire. The Gas Department have now laid a new steel main on a foundation which they have ascertained is firm.

TRADE NOTES.

Woodall-Duckham Verticals Extension at Cleethorpes.

The Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., have received an order for an extension to the existing vertical retort plant at the works of the Cleethorpes Gas Company. The new plant will consist of one setting of four 62-in. retorts, complete with recuperator and producer, and will have a total carbonizing capacity of 22·4 tons per twenty-four hours.

Rotary Displacement Pumps.

Messrs. Stothert & Pitt, Ltd., of Bath (London Office: 38, Victoria Street, S.W. 1), have published a catalogue illustrating the scope of the rotary displacement pump manufactured by them under the Feuerheerd patent. The firm treat each class of work as a separate subject, and now build a complete range of designs proved by experience to be efficient for the pumping of fluids varying in consistency from that of motor spirit to heavy oils and asphalts—the latter rising to temperatures in the neighbourhood of 380° C.

Derbyshire Gas Amalgamation.—The Killamarsh Gas Company have decided to amalgamate with the Eckington and Mosborough Gas Company; and a resolution has been passed to apply to the Board of Trade for a Special Order under section 10 of the Gas Regulation Act to give permission for the amalgamation and authority to increase the capital.

"A Bergin Process."—Said to have posed as a collector employed by the Blackpool Gas Department, and to have examined gas meters, Joseph Bergin, of Preston, was committed for trial by the Blackpool magistrates, on Nov. 23, on a charge of stealing 1s. 3d. from a gas meter. The Chief Constable said that accused called at a house and told the occupier he was a collector from the Gas Department. He examined the meter, and said there was 1s. 9d. in the meter, and he had left 4d. to go on with. He did not give a receipt. The meter had been broken open. Accused pleaded not guilty, and reserved his defence.

Brown-Coal Gas in Germany.—It is reported from Cologne that, according to the "Koelnische Zeitung" of Oct. 1, the attempt of the central German brown-coal industry to manufacture a gas capable of being utilized for distant gas supply has been completed successfully. Furthermore it is assumed that proposals will be submitted, in the course of the autumn, to the various municipal and district associations in central Germany, with a view to starting experiments on a larger scale with such brown-coal gas distribution. The report states that the district association at Cassel will, in conjunction with the municipal gas-works, consider the question whether distant gas supply can be laid on in its district from the brown-coal areas of Hesse and central Germany.—"Engineering," Nov. 11.

CALORIFIC POWER AT A GLANCE.

Alexander Wright
& CO., LTD.,
WESTMINSTER, S.W.1.
SOLE LICENSEES.

Eastbourne Co-Partnership and Pension Schemes.

The Town Hall was comfortably filled on the evening of Nov. 17, with approximately 300 members of the staff and workmen of the Eastbourne Gas Company, who, at the invitation of the Directors, gathered round the festive board. The better part of the hour which followed the repast was filled with brief addresses by Mr. Frank H. Jones,, M.Inst.C.E. (Deputy-Chairman), who presided in the regretted absence of the Chairman of the Company (Mr. Caleb Diplock), and by Mr. Benjamin Bradford and Mr. F. Eliot Williams, O.B.E. Mr. Bradford, as Chairman of the Co-Partnership Committee, indulged in some happy reminiscences of the past dozen years, including the disturbing elements of the war. He properly congratulated everybody present that co-partnership had come out of it all triumphantly, with the result that between £2000 and £3000 each year was now passing into the hands of the co-partners, as calculated bonus upon the amount of their wages and salaries. Mr. Jones and Mr. Williams dealt more particularly with the scheme of pensions which has been prepared, and which comes into operation on Jan. 1 next. A most interesting time of question and answer ensued, when Mr. Williams went through the rules of the superannuation fund. The keenest interest was manifested by all present in the proposals contained in the scheme (to which all the members of the fund will be contributors). The basis of the fund is a fifty-fifty one; and genuine enthusiasm was evidenced by all in the wise and helpful provisions which the Directors have caused to be embodied in the rules of the fund. Mr. E. A. Smith (Works Foreman) proposed the health of the Chairman and Directors. This was drunk heartily; and Mr. C. J. Vinall replied on behalf of himself and his colleagues. The remainder of the evening was given up to music.

Reduction in Price at Devizes.—The price of gas has been reduced, as from the September meter readings, by 6d. per 1000 c.ft., bringing the charge down to that of the pre-strike period.

The Dry Gas Carburetter (Parent Syndicate) has been registered as a private Company, with a nominal capital of £2000 (1000 preferred ordinary of £1 and 20,000 deferred of 1s.), to acquire and test the invention of an improved carburettor for internal combustion engines.

Royal Sanitary Institute.—The Royal Sanitary Institute, of 90, Buckingham Palace Road, London, S.W. 1, are arranging a health exhibition at Plymouth in July, 1928. Heating, cooking, lighting, and ventilating appliances will figure among the exhibits. Applications for space must be received by June 23.

Explosion in Leeds Street.—Three men were slightly injured through a gas explosion which occurred last week at a road excavation at the junction of King Street and Infirmary Street, Leeds. Workmen of the Electricity Department were laying a cable when they fractured a 3-in. gas main. The Gas Department were communicated with, but meantime the escaping gas filled a number of old archways in the road. A spark from a pick ignited the gas, and an explosion occurred.

Lancaster Gas Quality.—At the Lancaster Town Council meeting on Nov. 30, Councillor Till answered questions regarding the quality of the gas. It was explained that there had been a fire in the coal bunkers, and about 50 tons of coal were affected, with the result that, when this coal was automatically used, it did not produce the results desired. There had also been complaints traced to the flooding of cellars; but the Engineer (Mr. G. Dixon) was confident that the new plant was doing its work effectively, and that everything would be satisfactory when they settled down.

Rubber Tubing in Weaving Mills.—Several cases of weavers being overcome by gas have occurred in Clayton-le-Moors. These cases are apt to arise in early winter, with the increased used of gas for illuminating purposes; and Mr. Hope (Secretary of the Clayton-le-Moors Weavers' Association) states that the cause is leakage resulting from flexible rubber tubes. Formerly, with plain gas jets, these tubes were not required; but with the increased use of mantles, rubber was employed to lessen the vibration. Steam corroded the rubber; and when a full pressure of gas was on, the gas leaked.

Damage to Lamp Columns by Motor Vehicles.—There were five cases at the Birmingham Police Court on Nov. 25 in which drivers of motor vehicles were summoned for damaging gas columns belonging to the Corporation. In three instances the summonses were withdrawn, as the amount of the damage had been paid. In a case against George Ash, Willenhall, it was stated that the motor van he was driving accidentally damaged a gas lamp owing to the skidding of the vehicle. The damage amounted to £4 5s. 6d. Mr. Marshall, who represented the defendant, urged that, as the damage was the result of an accident, the Corporation should not be favoured by being in a position to call upon the driver to pay. The Magistrates, however, ordered payment, with costs. William Mount, who did not appear, was ordered to pay £1 7s. 3d., and costs, for damaging another lamp column.

Gas-Works as Casual Wards.—During the winter months, the penniless tramps who pass through Buxton will be accommodated nightly in the retort houses at the gas-works in Ashwood Dale; and thus they will be saved the perilous journey of six or eight miles over the bleak and lonely moors, which are sometimes almost impassable, to the nearest workhouse, either at Chapel-en-le-Frith or Bakewell. At the gas-works, the men sleep near the retorts, on planks or sacks; and the action of the Corporation in placing this accommodation at their disposal is highly appreciated. Before the tramps are admitted to the gas-works they have to satisfy the police that they are without means or they cannot get accommodation elsewhere. They are then given a paper bearing the official police stamp, which serves as a pass for the retort houses. Mr. F. G. Shaw (the Manager) and his staff do their utmost for the comfort of these unfortunate people, who are full of gratitude at the excellent provision made for them.

River Pollution through Carelessness.

In a paper which he presented at the recent Public Works, Roads, and Transport Congress, Mr. F. H. Heald (Clerk to the Board of Conservators, Trent Fishery District) quoted a somewhat unusual example of river pollution arising from what he termed "casual or careless supervision." Serious complaints had, he said, been made that quantities of foul liquor smelling strongly of coal gas had entered, at intervals, a running stream. Suspicion fell at once on the gas-works of the local authority, alongside which the stream, at one point, flowed; but investigation proved that this suspicion was groundless. Next to be investigated was the works of a large firm in which power was obtained from a producer gas plant. Here the scrubbers were cleaned-out periodically; but definite assurance was obtained that nothing was allowed to get into the stream. But information obtained from this source did, in fact, lead to the discovery of the culprit. It appeared that the waste from the scrubbers was sold to a man who had a work-yard a mile or so higher up the stream; and it was his thoughtless habit to dump the dangerous stuff on the bank, in such a position that a considerable volume of the liquor found its way into the stream on each occasion that a fresh consignment arrived. A five minutes' chat sufficed to clear-up this trouble for ever. The offender had simply never considered the effect of his lack of thought and care!

Reduction in Price at Stourbridge.—The Stourbridge Town Council have adopted a recommendation of the Gas Committee that the price of gas for lighting and power purposes be reduced by 3d. per 1000 c.ft. from January next.

Exhibition at Swadlincote.—A gas exhibition was held at Swadlincote last week, the arrangements for which had been ably carried out by the Gas-Works Manager (Mr. C. H. Taylor). The exhibition was opened by Mr. H. T. Forman, Chairman of the Swadlincote Urban Council.

Reduction in Price at Maidstone.—The Directors of the Maidstone Gas Company have decided to reduce the price of gas in Maidstone by 0·4d. per therm from the December readings of the meters. The price after Dec. 31 will be 9·2d. per therm.

Cheaper Gas in North London.—The Directors of the Hornsey Gas Company have given notice to reduce the price of gas by 0·4d. per therm (equivalent to 2d. per 1000 c.ft.), from 9d. to 8·6d. per therm. This will apply after the next meter readings.

Fatality at the Black Rock (Brighton) Works.—Despite all efforts to rescue him, a man named Greenway lost his life on Friday, Dec. 2, through gas poisoning in a deep well at the Black Rock Works of the Brighton and Hove General Gas Company. He had entered the well, which is about 50 ft. deep; and when he failed to return, a man who had been keeping watch above tried to rescue him, but failed. Assistance was summoned; and it was found that there were great volumes of gas in the well. Eventually hopes of rescuing him alive had to be abandoned; and the well was then partially flooded, and the body recovered. A large holder is situated near the well.

Cheaper Gas at Burnley.—The Gas Committee of the Burnley Corporation have decided to reduce the price of gas by 1d. per therm for all purposes, from and after the meter reading this month. The new price will be 8d. per therm for ordinary meter, within and without the borough, less 5 p.ct. discount; with reductions to all domestic consumers, hotels, and shops, down to 6¼d. per therm. The prices for power, industrial and central heating purposes will now scale from 6d. to 4¼d. per therm, according to the quantity consumed, less 5 p.ct. Before this reduction, the price of gas was at the rate which obtained prior to the coal dispute, as the result of which the price was increased for one quarter only by 1d. per therm.

In a case of explosion during renovation of a house at Strabane, a plumber and gasfitter named Gallagher received injuries to his hands and face. There was an escape of gas, and Gallagher located the defect in a bedroom. He removed a board for investigation; and immediately there was a loud explosion, as he had a candle in his hand.

Electricity consumers at Leeds suffered serious inconvenience by a breakdown, on the evening of Dec. 1, at the Whitehall Road generating station. At the General Infirmary an operation was actually in progress, and had to be continued by the use of emergency lights. The corridors of the infirmary are fitted with emergency gas lights, which were brought into use.

The annual dinner of the New Grange Bowling and Golf Clubs, organized by the employees of Messrs. Alder & Mackay, Ltd., took place in Edinburgh on Friday evening, Nov. 25. All the members of the Board were present; Mr. William Grant presiding over the company of approximately a hundred. The Loyal Toast having been observed, Mr. Grant presented the prizes. Mr. H. E. Bennet complimented the Clubs on their commendable records for the year, remarking that the golfers had retained all the open trophies, while the bowlers had secured the Cockburn Cup, open to local clubs. The Clubs expressed their appreciation of the interest taken in them by the Board and management. A most enjoyable musical programme followed.

The Lord Mayor of Bradford (Alderman M. Conway), in pursuance of his policy of seeing for himself all phases of municipal work, followed up his recent visit to the modern gas plant at the Birkshall Works by a visit, on Nov. 30, to the large gas-works at Valley Road, where the plant is such that the Gas Department contemplate closing it down for re-equipment. The Lord Mayor, who was accompanied on the Valley Road visit by Alderman G. Walker (Chairman of the Gas Committee), Councillor Cowie (Deputy-Chairman), Mr. E. J. Sutcliffe (Engineer and General Manager), Mr. E. Crowther (Deputy Gas Engineer), and Mr. J. W. Roper (Works Manager), intimated that whenever a scheme for modernizing the Valley Road Gas-Works came before the City Council, it would have his hearty approval.

STOCK MARKET REPORT.

BUSINESS on the Stock Exchange last week continued to be affected by the activity in the new issues, and the approach of Christmas also cast a shadowy influence on markets. Of the new issues, the success of the Palestine loan was perhaps the most noticeable; but with the support of His Majesty's Government—the stock is guaranteed by the Treasury—it is thought in some quarters to have been offered too cheaply, and a premium of 1½ is already established.

Gilt-edged stocks, notwithstanding the adverse developments in the gold situation, were quite firm. Foreign stocks were irregular, and Home Rails continued to be depressed. In the Industrial market, the business done was mostly in specialities. Tobaccos and Chemicals were firmer, and the Cable Company's shares, which had fallen considerably earlier in the week, rallied towards the close.

The Gas Market was quite active, though there were no important changes in the stock values. Continental Union ordinary dropped two points; but at the present price (28-33) the yield on the dividend paid for the last year is under 3 p.c.

The following transactions were recorded during the week:

On Monday, Bournemouth 5 p.c. 13, "B" 12⅝, Colombo 29s. 3d., Commercial 93½, 94, 3 p.c. debenture 57, European 7½, 7 11/16, 7 3/8, 7 11/16, Gas Light and Coke 88¾, 89, 89¼, 89⅜, ¼ p.c. preference 77, 3 p.c. debenture 60¾, 61¼, Imperial Continental 141½, Newcastle and Gateshead 3½ p.c. 75¼, Oriental 103, South Suburban 104, 104½, 5 p.c. debenture. 95. Supplementary prices, Herne Bay 6¼ p.c. preference 5¼.

On Tuesday, Alliance and Dublin 91½, 92, British 112, Cardiff 100½, Commercial 93½, 93⅛, Continental Union 29, 7 p.c. preference 90, European 7½, Gas Light and Coke 88⅜, 89, 89⅜, 89½, 3½ p.c. maximum 62, 4 p.c. preference 77½, 3 p.c. debenture 60¾, 61⅛, Imperial Continental 142, Primitiva 20s. 0¾d., 20s. 1¼d., 20s. 3d., 20s. 4½d., 20s. 6d., 20s. 7½d., 4 p.c. consolidated debenture 74, 74½, South Metropolitan 103, 3 p.c. debenture 60. Supplementary prices, Exeter 5 p.c. debenture 97.

On Wednesday, Alliance and Dublin 91¼, 91⅝, 92, British 112, Commercial 92½, Continental Union 29, European 7⅞, 7⅝, Gas Light and Coke 88⅞, 88⅞, 89, 89¼, 89⅜, 3½ p.c. maximum 63, 3 p.c. debenture 61⅛, Imperial Continental 141, 141½, 143, Newcastle and Gateshead 3½ p.c. 77⅜, 78½, Primitiva 20s. 1½d., 20s. 6d., 4 p.c. consolidated debenture 74, South Metropolitan 103, 103⅜, 3 p.c. debenture 60, Uxbridge Maidenhead 5 p.c. preference 86½. Supplementary prices, Horley 10 p.c. "A" 119½, 120.

On Thursday, Continental Union 29, European 7⅞, 7⅞, 7 15/16, Gas Light and Coke 88¼, 88⅜, 89¼, 89¼, 89⅜, 3½ p.c. maximum 62½, ¼ p.c. preference 77, 3 p.c. debenture 60¾, 61¼, 61⅛, Imperial Continental 141½, Primitiva 20s., 20s. 1½d., 20s. 4½d., 4 p.c. debenture (1911) 74, South Metropolitan 102⅜, 103. Supplementary prices, Croydon 7½ p.c. preference 103½, Horley District "A" 119½.

On Friday, Cape Town 7⅛, 4½ p.c. preference 6⅞, Colonial 8 p.c. preference 21s., Commercial 3 p.c. debenture 57½, 58½, Gas Light and Coke 87½, 88, 88⅛, 88⅝, 88⅞, 89, 89¼, 3½ p.c. maximum 62, Imperial Continental 141½, 142½, Primitiva 19s. 9d., 19s. 10½d., 20s., 20s. 6d., South Metropolitan 103, 6½ p.c. debenture 103, 103½, South Suburban 5 p.c. 104, Uxbridge, Maidenhead, 5 p.c. 89½, 90. Supplementary prices, Croydon 7½ p.c. preference 104½, Danish 8½.

Money was extremely plentiful in Lombard Street at the end of the week. Fresh advances for the night were obtainable at an early hour at 3 p.c., and the rate finally dropped to 2½ p.c. Old loans were generally renewed at 3¼ p.c. Treasury Bills were allotted at £4 6s. 0·99d. p.c., which was 1d. p.c. above the previous week's rate. This had a steadying effect on the discount market.

On the Foreign Exchange Market wild movements took place in the Spanish currency, which, after rising to 29.89, closed at 29.34, a decline of 35½c. on balance. Sterling on New York, under the stimulus of American sales of dollars, rose to 4.88 3/16, but dropped 1/16 at the close. Belgian currency continued to appreciate, closing at 34.89; and Dutch florins finished higher at 12.07 7/16. French francs were steady at 124, and Italian lire also at 89.85.

There were no Gold movements, the price being quoted at 84s. 11½d. per oz. Silver remained unaltered at 26½d. per oz.

The Bank Rate is 4½ p.c., to which it was reduced from 5 p.c. on April 21. Bankers' deposit rates are 2½ p.c. The deposit rates of the discount houses are 2½ p.c. at call and 2¾ p.c. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr	Dividends. Last Hf. Yr	NAME.	Quotations. Dec. 2.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Sept. 8	5	5	Aldershot 5 p.c. max. C.	68—73	..	..
322,992	,,	,,	4	4	Do. 4 p.c. Pref.	67—70	..	..
1,561,868	,,	Sept. 29	7	7	Alliance & Dublin Ord.	90—94	..	91½—92
374,000	,,	July 14	4	4	Do. 4 p.c. Deb.	64—67	..	..
532,654	,,	Aug. 15	—	7	Barnet Ord. 7 p.c.	104—105	..	..
300,000	1	Oct. 13	1/7½	1/7½	Bombay, Ltd.	21/3—23/6	..	..
170,000	10	Aug. 25	8½	8¼	Bournemouth 5 p.c.	12½—13½	..	13
500,050	10	,,	7	7	Do. B 7 p.c.	12—12½	..	12⅜
275,000	10	,,	6	6	Do. Pref. 6 p.c.	10⅜—11½	..	..
50,000	Stk.	June 29	3	3	Do. 3 p.c. Deb.	55—58	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
357,900	,,	Aug. 25	—	7½	Brighton & Hove 6 p.c. Con.	108—111	..	..
311,800	,,	,,	—	6/8/6‡	Do. 5 p.c. Con.	96—99	..	..
1,287,500	,,	July 28	5	5	Bristol 5 p.c. max.	87—88a	..	..
855,000	,,	Sept 29	7	8	British Ord.	109—112	..	112
100,000	,,	June 29	7	7	Do. 7 p.c. Pref.	114—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	74—77	..	..
200,000	,,	,,	—	83/2	Do. 5 p.c. Red. Deb.	95—98	..	..
100,000	10	Nov. 24	6	6	Cape Town, Ltd.	7—8	..	7⅞
100,000	10	Oct. 27	4½	4½	Do. 4½ p.c. Pref.	6—7	..	6⅞
150,000	Stk.	June 29	4½	4½	Do. 4½ p.c. Deb.	70—75	..	..
626,850	,,	July 28	6	6	Cardiff Con. Ord.	100—103	..	100½
237,860	,,	June 29	7½	7½	Do. 7½ p.c. Red. Deb.	103—106	..	..
157,150	,,	Aug. 11	6½	5	Chester 5 p.c. Ord.	87—92b	..	..
79,188	1	Oct. 13	12/-	12/-	Colombo Ltd. Ord.	28/—30/-	..	29/3
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
821,490	1	Oct. 13	1/9⅜	1/9⅜	Colonial Gas Assn. Ld. Ord.	24/—26/-	..	..
173,900	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/—22/-	..	21/-
2,073,250	Stk.	July 14	—	5	Commercial Ord.	92—94	..	92½—94
475,000	,,	June 16	8	8	Do 8 p.c. Deb.	56—59	..	57—58½
800,000	,,	Sept. 29	11	11	Continental Union, Ltd.	28—33	−3	29
100,000	,,	,,	7	7	Do. 7 p.c. Pref.	87—92	..	90
787,560	,,	Aug. 11	6½	6¼	Croydon sliding scale	98—101	..	..
403,100	,,	,,	5	5	Do. max. div.	80—83	..	..
492,270	,,	Aug. 25	9	8	Derby Con.	108—105e	..	..
55,000	,,	June 29	4	4	Do. Deb.	73—75c	..	..
309,000	,,	Aug. 25	5	5	East Hull Ord. 5 p.c.	78—81	..	..
50,000	,,	June 16	5	5	Eastbourne 5 p.c. Deb.	90—95	..	..
1,002,180	10	Sept. 29	13	14	European, Ltd.	7⅜—8½	+⅛	7⅜—7 15/16
6,147,460	Stk.	July 28	5	5	Gas Light & Coke 4 p.c. Ord.	88—90	−1	87⅛—89½
2,800,000	,,	,,	8½	8¼	Do. 8¼ p.c. max.	61—63	..	62—63
4,187,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	76—79	..	77—77½
5,008,690	,,	June 16	8	8	Do. 8 p.c. Con. Deb.	60—62	+½	60¾—61½
181,815	,,	,,	6	6	Do. 6 p.c. Br'tf'd Rd. Db.	102—105	..	..
1,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	99—101	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Aug. 25	6¼	6¼	Hastings & St L. 5 p.c. Conv	88—91	..	..
288,740	,,	,,	5½	5½	Do. 5½ p.c. Conv.	72—75	..	..
70,000	10	Oct. 13	110	110	Hongkong & China, Ltd.	12—13	..	..
173,300	Stk.	Aug. 25	5	5	Hornsey Con. 5½ p.c.	73—76	..	..
1,976,000	,,	Nov. 10	10	10	Imperial Continental Cap.	141—144	+1	141—143
233,130	,,	Aug. 11	8½	8½	Do. 5½ p.c. Red. Deb.	68—70	..	..
235,242	,,	Aug. 11	6½	7	Lea Bridge 5 p.c. Ord.	94—97	..	..
2,145,907	,,	Aug. 11	5½	5½	Liverpool 5 p.c. Ord.	88½—89½b	+1	..
600,000	,,	Sept. 29	7	7	Do. 7 p.c. Red. Pref.	101—103b	..	..
165,786	,,	Aug. 25	8	9	Maidstone 5 p.c. Cap.	107—112	..	..
75,000	5	June 16	17	18	Malta & Mediterranean	5½—6	+½	..
841,920	Stk.	Nov. 24	17	15	Montevideo, Ltd.	89—91	..	..
2,061,815	,,	July 28	5	5	Newcastle & Gateshead Con.	77½—78½d	+2½	..
360,929	,,	,,	4	4	Do. 4 p.c. Pref.	67½—69½d	..	..
691,705	,,	June 29	8½	8½	Do. 8½ p.c. Deb.	66½—67½d	..	..
131,785	,,	Aug. 25	—	6/18,0	North Middlesex 6 p.c. Con.	93—96	..	..
300,000	,,	Nov. 24	7	9	Oriental, Ltd.	100—103	..	103
188,120	,,	June 29	7½	7½	Plym'th & Ston'house 5 p.c.	105—110	..	..
414,500	,,	Aug. 25	7½	7½	Portsm'th Con. Stk. 4 p.c. Std.	102—105	..	..
236,782	,,	,,	5	5	Do. 5 p.c. max.	76—79	..	..
2,289,909	1	—	—	—	Primitiva Ord.	19/9—20/9	−/6	19/9—20/7½
392,200	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	85—85*	−1	..
600,000	Stk.	July 28	4	4	Do. 4 p.c. Red. Deb. 1911	73—75	+1	74
434,968	,,	June 29	—	4	Do. 4 p.c. Cons. Deb.	73—75	+1	74—74½
150,000	10	Sept. 29	6	6	San Paulo 6 p.c. Pref.	7½—8½	..	..
125,000	50	June 29	5	5	Do. 5 p.c. Red. Deb.	47—49	..	..
270,000	Stk.	Sept. 8	5½	5½	Sheffield A	102—104e	..	..
419,968	,,	,,	5½	5½	Do. B	102—104e	..	..
1,047,000	,,	,,	5½	5½	Do. C	102—104e	..	..
90,000	10	May 26	4	6	South African	4—6	..	..
6,609,898	Stk.	Aug. 11	7	5	South Met. Ord.	102—104	..	103½—103¾
500,000	,,	—	—	—	Do. 6 p.c. Irred. Pf.	110—113	..	..
1,896,445	,,	July 14	3	3	Do. 3 p.c. Deb.	59—62	+1	60
734,000	,,	Sept. 8	6½	6½	Do. 6½ p.c. Red. Db.	102—104	..	103—103½
91,500	,,	Aug. 11	8½	8½	South Shields Con.	101—103d	..	..
1,343,795	,,	July 28	6½	6½	South Suburban Ord. 5 p.c.	102—105	..	104—104½
368,837	,,	June 16	5	5	Do. 5 p.c. Deb.	93—96	..	95
647,740	,,	Sept. 8	5	5	South'mpton Ord. 5 p.c. max.	78—78	..	..
121,275	,,	June 29	4	4	Do. 4 p.c. Deb.	73—76	..	..
250,000	,,	Aug. 25	7	7	Swansea 7 p.c. Red. Pref.	103—106	..	..
200,000	,,	June 16	6½	6½	Do. 6½ p.c. Red. Deb.	100—103	..	..
120,000	,,	July 28	7½	7½	Tottenham District A 5 p.c.	105—108	..	..
662,275	,,	,,	6½	6½	Do. B 3½ p.c.	89—92	..	..
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	95—98	..	..
181,365	,,	June 16	4	4	Do. 4 p.c. Deb.	72—75	..	..
238,561	,,	Sept. 29	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, &	81—83d	..	..
289,094	,,	Aug. 25	6½	6½	Wycombe 5 p.c.	85—90	..	89½—90
88,330	,,	,,	5	5	Do. 5 p.c. pref.	88—88	..	86½
80,990	,,	July 14	8½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	125—130	..	..
255,836	,,	,,	7	7	Do. B 3½ p.c.	105—110	..	..
31,155	,,	,,	5/19/0	5/19/0	Do. C and New	90—95	..	..
58,990	,,	,,	8⅜	8⅜	Do. Wimbledon 5 p.c.	100—105	..	..
98,990	,,	,,	7½	7½	Do. Epsom 5 p.c.	107—112	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref.	85—90	..	..
88,516	,,	June 29	3	3	Do. 3 p.c. Deb.	56—59	..	..
284,743	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle e.—Sheffield. * Ex. div. † Paid free of income-tax. ‡ For year.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.

UNDISPLAYED ADVERTISEMENTS: Situations Wanted, Six Lines and under (about 36 words), 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER
United Kingdom & Ireland	Advance Rate:	35/-	18/-	10/-
	Credit Rate:	40/-	21/-	11/6
Dominions & Colonies & U.S.A. Payable in Advance		35/-	—	—
Other Countries in the Postal Union. Payable in Advance		40/-	22/6	12/6

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, LIMITED, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

THE "GAS SALESMAN."

The "GAS SALESMAN" is included as a supplement to the "JOURNAL" eighteen times a year—twice a month from October to March, and once a month from April to September. Additional copies are also obtainable at the following rates: Annual Subscription 6/-, post free, payable in advance. Single copies (by post) 4½d. In Bulk for Distribution among Gas Service Staffs—100 copies of each issue, 30/-; 50 copies, 16/-; 25 copies, 8/-; 12 copies, 4/-, all plus carriage.

All communications to WALTER KING, LTD., 11, BOLT COURT, FLEET STREET, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Central 6055.

GAS PURIFICATION & CHEMICAL CO., LTD.,
PALMERSTON HOUSE, 34, OLD BROAD STREET, LONDON, E.C. 2.

OXIDE OF IRON
AS SUPPLIED BY THIS COMPANY FOR OVER 50 YEARS ON SALE OR LOAN.

SPENT OXIDE
PURCHASED IN ANY DISTRICT.
Telegrams: "PURIFICATION STOCK, LONDON." *Telephone:* LONDON WALL, 9144.

GAS WORKS STEAM PLANT.
We can meet your requirements for BOILERS, RECEIVERS, TANKS, WASHER TUBES, SIZING SCREENS, PLATE WORK, BOILER SETTINGS, CHIMNEYS (brick and steel).
INQUIRIES INVITED.
H. & T. DANKS (NETHERTON) Ltd.,
NETHERTON, DUDLEY.
(See illustrated page advertisement Sept. 28, p. 723.)

CARBONATE OF AMMONIA
Special Non-Caking Quality "Balloon" Brand for Neutralising Sulphate.
BROTHERTON & Co., LTD. LEEDS.

"LUX" PURIFYING MATERIAL.
THE PREMIER MATERIAL FOR GAS PURIFICATION.

THOS. DUXBURY AND CO.
SOLE AGENTS FOR ENGLAND, SCOTLAND, IRELAND, WALES AND THE COLONIES (except CANADA).
16, DEANSGATE, MANCHESTER. *Telegrams:* "Darwinian, Manchester." *Tel. Nos.:* 8628-9 City.
PALACE CHAMBERS, WESTMINSTER, S.W.1. *Telegrams:* "Darwinian, Parl, London." *Tel. Nos.:* 4501-2 Victoria.

GEORGE WILSON GAS METERS, Ltd.
for
GAS-METERS, ORDINARIES, SLOTS, AND REPAIRS,
Foleshill Road, COVENTRY.
Telephone: 596. Telegrams: "GASMETER,"
and at 268, Stockport Road, MANCHESTER.
Telephone: RUSHOLME 976. Telegrams: "GASMETER,"
and 46 & 47, Auckland Street, LONDON, S.E.11.
Telephone: HOP 647. Telegrams: "GASEOUS LAMB."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815, Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

MEWBURN, ELLIS, & CO.,
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C. 2.
Telegrams: "Patent, London." Phone 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

THE BRITISH GAS PURIFYING MATERIALS CO., LTD.,
99, LONDON ROAD, LEICESTER.
Telegrams: "BRIPURIMAT, LEICESTER." Telephone: LEICESTER 5006.
Solicit enquiries for:—
NATURAL BRITISH PURIFYING MATERIAL,
NATURAL HYDRATED OXIDE OF IRON,
FIRST QUALITY DUTCH BOG ORE,
BEST QUALITY BELGIAN BOG ORE,
"PREPARED" AND "UNPREPARED" ARTIFICIAL OXIDES.
SPENT OXIDE PURCHASED.
LONDON OFFICE:
34/35, NORFOLK STREET, STRAND, W.C. 2.
Telegrams: "BRIPURIMAT ESTRAND LONDON." Telephone: CENTRAL 3932.

SULPHURIC ACID.
SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.,
36, Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN. LONDON."
Telephone—ROYAL 1166.

WEIGHBRIDGES
FOR Motor Lorries and Railway Traffic can be seen erected at our works READY FOR DELIVERY. Inspection by your Engineer invited and a test by your Local Inspector of Weights and Measures before delivery. Every machine a High-Class Engineering Product and fully guaranteed.
CHARLES ROSS, LIMITED,
SHEFFIELD.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR (SATURATORS), LTD., Chemical Plant Engineers, Blackhorse Street Mills, BOLTON.
Telegrams—"SATURATORS, BOLTON." Telephone 848.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BALE & CHURCH, LTD.,
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Royal 1484.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.,
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Royal 1484.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
(See "Gas Salesman," Nov. 30, p. 282.)
BALE & CHURCH, LTD.,
33, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Royal 1484.

J. E. C. LORD (Manchester), Ltd., Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, &c.

PATENTS for Inventions, Trade Marks. Advice, Handbooks and Consultations free. KING'S PATENT AGENCY LTD., Director B. T. KING, C.I.M.E., Regd. Patent Agent, G.B., U.S., and Can., 146A, QUEEN VICTORIA ST., E.C. 4, and 6, QUALITY CT. (next Pat. Off.), LONDON, W.C. 40 years' refs. 'Phone Cent. 0682.

APPOINTMENTS, &c., VACANT.

WHEN Filling Vacancies, please REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, HAS THE FIRST CALL ON YOUR CONSIDERATION.

SLOUGH GAS AND COKE COMPANY.

APPLICANTS for the Positions of FITTER and MAINTENANCE FITTER are THANKED and informed that THE VACANCIES HAVE NOW BEEN FILLED.

HEAD Draughtsman, Experienced in all Gas-Works Plant and accustomed to carrying contracts through all stages required by firm of Gas-Works Contractors.
Reply, in Confidence, to No. 7805, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

SHIPLEY URBAN DISTRICT COUNCIL.

APPLICATIONS are invited for the post of JUNIOR CHEMIST at the Council's Gas-Works. The person appointed will act under the direction of the Engineer, and must be capable of carrying out Routine Gas-Works Tests.
Applications, stating Salary required, Age, and Qualifications, should be sent, together with *copies* of Two Testimonials, to the undersigned, not later than Monday, the 19th inst.

H. BARNES,
Clerk of the Council.

Council Offices,
Shipley,
Dec. 2, 1927.

CONTENTS.

EDITORIAL NOTES.

Coal Situation and Selling Organizations . 733
Gas Lighting Progress 734
Gas in the Next Session 734
Coke-Oven Industry Seeking New Business . 735
Synthetic Nitrogen Entente—Committed for Trial—All-Electric Houses as "Refrigerators"—The "GAS SALESMAN"—Second Bituminous Coal Conference—The Factories Bill—Unemployment Returns . . 736

Personal 736
Obituary 737
Electricity Supply Memoranda 737
Second Bituminous Coal Conference . . . 738
Forthcoming Engagements 738
Potential Investments. V.—The Liverpool Gas Company 739
Notes on New Books 739
New Purifying Plant at Haworth—Installation by Messrs. Clapham Bros., Ltd. . . . 740
Gasholder Tank Conversion at Hyde . . . 741
American Gas Association—Notes from Reports and Papers 742
Manchester District Institution of Gas Engineers—
Dry Oxide Purification. By J. W. Thompson 743
Enterprising Advertising in Australia . . . 745
Glover-West Verticals at Altrincham—Inauguration Ceremony at the Moss Lane Works 745
Gas Acts for 1927 748
Progress in Illumination—Recent Activities of the Gas Lighting Industry 749
Lectures to Smoke Inspectors 750
Institute of Fuel—
The British Coking Industry. By Robert Ray, B.Sc., A.I.C., M.I.Chem.E. . . 751
Cheaper Electricity. By Sir Philip Dawson, M.P. 752
Conversion of Coal into Oil by the Bergius Method. By J. Ivon Graham and D. G. Skinner 753
A British Road Tar Association Exhibit . . 754

City and Guilds of London Institute—Report on the Work of the Session 1926-27 . . . 754
Wales and Monmouthshire Junior Gas Association—
Co-Partnership. By T. Noall 755
Manchester and District Junior Gas Association—
Visit to Ellesmere Port 756
Port and Cement and its Uses. By H. J. Gillett 756
London and Southern District Junior Gas Association 757

CORRESPONDENCE.

Properties of Glycerine-Water Mixtures . . 758
A Suggestion 758
Explosion in a 24-Inch Gas-Main 758
Dry Oxide Purification 758
Nuneaton Gas and a Two-Part Tariff . . . 758
Remembrance Day Appeal 758

PARLIAMENTARY INTELLIGENCE.

House of Commons—
Scientific Research 759
Reinstatement of Gloucester Main Roads . 759

REGISTER OF PATENTS.

Applications for Patents 756

LEGAL INTELLIGENCE.

Public Lighting Dispute at Crediton . . . 759
Action Regarding Tar Supplies 759
Chalk Fuel, Power Gas, and Bye-Products Corporation—Defendants Committed for Trial 760
Unpaid Account for Clinker 760
Heathfield and Waldron Gas Company . . 760

MISCELLANEOUS NEWS.

Department of Scientific and Industrial Research—Physical and Chemical Survey of the National Coal Resources 761
Aldershot Gas, Water, and District Lighting Company—Electricity (Extension) Order . 761

MISCELLANEOUS NEWS—(*continued*).

Parkinson Stove Company (Australia), Ltd.—New Factory at West Footscray, Melbourne 761
Brentwood Gas-Works Visited—1925 Society Inspect Process of Gas Manufacture . . 761
Newcastle-upon-Tyne and Gateshead Gas Company—Application to Acquire the Tynemouth Gas Company 762
Gas Regulation Act Applications 765
Lecture on Wrought-Iron Tubes and Fittings at the Showrooms of the Leamington Priors Gas Company 765
Coal Trade Reports—
North-East Coast 766
Yorkshire and Lancashire 766
Midlands 766
Redhill Gas Company's Co-Partnership . . 766
Current Sales of Gas Products 766
Extensions 766
Stock Market Report 767

PARAGRAPHS.

Internal Corrosion and Dehydration of Gas . 750
Transactions of the Australian Gas Institute . 754
The "Practical Engineer" Mechanical Pocket Book and Diary, 1928—Britain's Fuel Problems 757
Big Demand for Gas Apparatus in Birmingham 760
Unventilated Bathroom Fatality 765
New Joint Stock Companies—Fatal Accident at the Warwick Gas-Works 766
Pittsburg Gasholder Accident—Showroom for Batley—Gas Explosion at Birmingham—Matlock Gas Prices—Reduction in Price at Newcastle—Bognor Capital Issue—Gas-Works as Casual Wards—Rust Causes a Gas Stove Fatality—Lurgan Gas Undertaking—Offer of Coke Oven Gas to Glasgow—Teignmouth Gas-Works Improvements—The Fatality at the Brighton Gas-Works—Chapel and Whaley Gas Company—Buxton Gas Undertaking—Gas and Electricity at Deal and Walmer—New Showrooms of the Liverpool Gas Company—Industrial Accidents 768

For List of "JOURNAL" Advertisers, see p. 769.

— ONLY —

GENERAL

GAS COOKERS

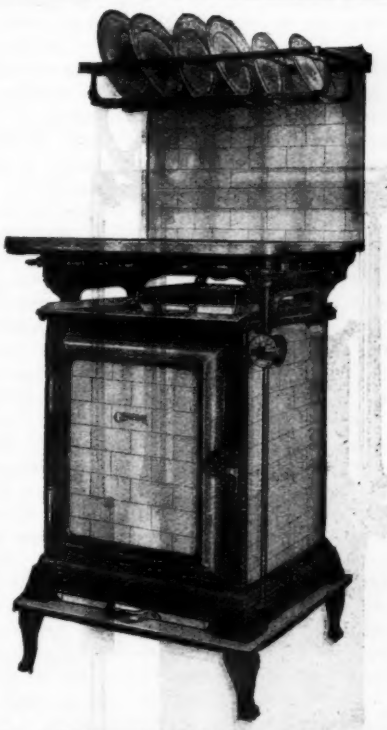
are fitted

WITH AN OVEN THERMOSTAT

Regulated

FROM THE FRONT

WORKS:—GUIDE BRIDGE, MANCHESTER



No. 1 TRIUMPH COOKER showing:—

ECONOMIC AUTO-HEAT REGULATED

fitted in position.

They Last Longer

BECAUSE THEY ARE BETTER MADE

The Thomas Glover Meter is known throughout the world as the better quality Meter.

Thicker and stronger case-work: spindles and wheels of solid brass or gun-metal only; diaphragms of the finest Persian skins, scientifically treated—these are some features of the Thomas Glover manufacture.

ESTD. 1844

GOTHIC WORKS — *Branches BELFAST, BIRMINGHAM, BRISTOL, DUBLIN,—*

THOMAS GLOVER & CO. LTD.

EDMONTON, N.18. — *EDINBURGH, GLASGOW, MANCHESTER & NEWCASTLE-ON-TYNE.*

PARKINSON'S

TEST GAS HOLDERS.

Constructed and fitted up in accordance with Board of Trade requirements. Every appliance for Meter Testing. Full particulars on application.

W. PARKINSON & CO.

INCORPORATED IN PARKINSON & COWAN (GAS METERS), LTD.

Cottage Lane, City Rd., LONDON, E.C.1. — Bell Barn Road, BIRMINGHAM. — Mornington St., Ormeau Rd., BELFAST.

'Grams:—"Index Isling London." "Gasmeters Birmingham." "Prepayment Belfast."
'Phone Nos.:—4270 Clerkenwell. 2348 Midland Birmingham. 3374 Belfast.